Service Manual

Model 437101/437102/437103/437104/
437106/437112/437118/437124

μR20000

YOKOGAWA
Yokogawa Electric Corporation

SM 04P02B01-01E
1st Edition

Important Notice to the User

- This manual contains information for servicing YOKOGAWA's μR20000. Check the serial number to confirm that this is the correct service manual for the instrument to be serviced. Do not use the wrong manual.
- Before any maintenance and servicing, read all safety precautions carefully.
- Only properly trained personnel may carry out the maintenance and servicing described in this service manual.
- Do not disassemble the instrument or its parts, unless otherwise clearly permitted by this service manual.
- Do not replace any part or assembly, unless otherwise clearly permitted by this service manual.
- In principle, Yokogawa Electric Corporation (YOKOGAWA) does not supply parts other than those listed in the customer maintenance parts list in this service manual (mainly modules and assemblies). Therefore if an assembly fails, the user should replace the whole assembly and not components within the assembly (see "Note"). If the user attempts to repair the instrument by replacing individual components within the assembly, YOKOGAWA assumes no responsibility for any consequences such as defects in instrument accuracy, functionality, reliability, or user safety hazards.
- YOKOGAWA does not offer more detailed maintenance and service information than that contained in this service manual.
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Note

YOKOGAWA instruments have been designed in a way that the replacement of electronic parts can be done on an assembly (module) basis by the user. YOKOGAWA instruments have also been designed in a way that troubleshooting and replacement of any faulty assembly can be done easily and quickly. Therefore, YOKOGAWA strongly recommends replacing the entire assembly over replacing parts or components within the assembly. The reasons are as follows:

- The instruments use high-performance microprocessors, large scale CMOS gate arrays, and surface-mount components to provide state-of-the-art performance and functions.
- Repair of components can only be performed by specially trained and qualified maintenance personnel with special highly accurate tools, including costly ones.
- When taking the service life and cost of the instruments into consideration, the replacement of assemblies offers the user the possibility to use YOKOGAWA instruments more effectively and economically with a minimum in downtime.

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Introduction

This manual contains information for servicing YOKOGAWA's μR20000.

Note

This is the first edition of the manual, dated March 2006.

WARNING

This service manual is to be used by properly trained personnel only. To avoid personal injury, do not perform any servicing unless you are qualified to do so. Refer to the safety precautions prior to performing any servicing. Even if servicing is carried out according to this service manual, or by qualified personnel, YOKOGAWA assumes no responsibility for any result occurring from that servicing.

Safety Standards and EMC Standards

This recorder conforms to IEC safety class I (provided with terminal for protective grounding), Installation Category II, Measurement Category II (CAT II), and EN61326-1 (EMC standard), class A (use in a commercial, industrial, or business environment). This recorder is designed for indoor use.

Precautions Related to the Protection, Safety, and Alteration of the Product

- The following safety symbols are used on the product and in this manual.

"Handle with care." To avoid injury and damage to the instrument, the operator must refer to the explanation in the manual.

Protective ground terminal

AC

"High temperature." To avoid injury caused by hot surface, do not touch locations where this symbol appears.

- For the protection and safe use of the product and the system controlled by it, be sure to follow the instructions and precautions on safety that are stated in this manual whenever you handle the product. Take special note that if you handle the product in a manner that violate these instructions, the protection functionality of the product may be damaged or impaired. In such cases, YOKOGAWA does not guarantee the quality, performance, function, and safety of the product.
- When installing protection and/or safety circuits such as lightning protection devices and equipment for the product and control system or designing or installing separate protection and/or safety circuits for fool-proof design and fail-safe design of the processes and lines that use the product and the control system, the user should implement these using additional devices and equipment.
- If you are replacing parts or consumable items of the product, make sure to use parts specified by YOKOGAWA.
- This product is not designed or manufactured to be used in critical applications that directly affect or threaten human lives. Such applications include nuclear power equipment, devices using radioactivity, railway facilities, aviation equipment, air navigation facilities, aviation facilities, and medical equipment. If so used, it is the user's responsibility to include in the system additional equipment and devices that ensure personnel safety.
- Do not modify this product.

WARNING

- **Power Supply**
  Ensure that the source voltage matches the voltage of the power supply before turning ON the power.
- **Protective Grounding**
  Make sure to connect the protective grounding to prevent electric shock before turning ON the power.
- **Necessity of Protective Grounding**
  Never cut off the internal or external protective earth wire or disconnect the wiring of the protective earth terminal. Doing so invalidates the protective functions of the instrument and poses a potential shock hazard.
- **Defect of Protective Grounding**
  Do not operate the instrument if the protective earth or fuse might be defective. Make sure to check them before operation.
- **Do Not Operate in an Explosive Atmosphere**
  Do not operate the instrument in the presence of flammable liquids or vapors. Operation in such environments constitutes a safety hazard.
- **Do Not Remove Covers**
  The cover should be removed by YOKOGAWA's qualified personnel only. Opening the cover is dangerous, because some areas inside the instrument have high voltages.
- **External Connection**
  Connect the protective grounding before connecting to the item under measurement or to an external control unit.
- **Damage to the Protective Structure**
  Operating the recorder in a manner not described in this manual may damage its protective structure.

Exemption from Responsibility

- YOKOGAWA makes no warranties regarding the product except those stated in the WARRANTY that is provided separately.
- YOKOGAWA assumes no liability to any party for any loss or damage, direct or indirect, caused by the user or any unpredictable defect of the product.

Conventions Used in This Manual

WARNING

Calls attention to actions or conditions that could cause serious or fatal injury to the user, and precautions that can be taken to prevent such occurrences.

CAUTION

Calls attentions to actions or conditions that could cause light injury to the user or damage to the instrument or user's data, and precautions that can be taken to prevent such occurrences.

Overview of This Manual

This manual is meant to be used by qualified personnel only. Make sure to read the safety precautions at the beginning of this manual as well as the warnings and cautions contained in the chapters relevant to any servicing you may be carrying out.

This manual contains the following chapters.

Chapter 1 Principles of Operation
Describes the principles of operation of the recorder.

Chapter 2 Troubleshooting
Lists problems that can occur and gives corrective actions.

Chapter 3 Testing
Gives procedures for testing the performance of the instrument.

Chapter 4 Adjustments
Explains how to adjust the instrument.

Chapter 5 Schematic Diagram
Provides a system configuration diagram.

Chapter 6 Customer Maintenance Parts List
Contains exploded views and a list of replaceable parts.

Chapter 7 Replacing Parts
Provides procedures for replacing components of the recorder.

Specifications are not included in this manual. For specifications, refer to the *μR20000 Recorder User's Manual* (IM 04P02B01-01E).

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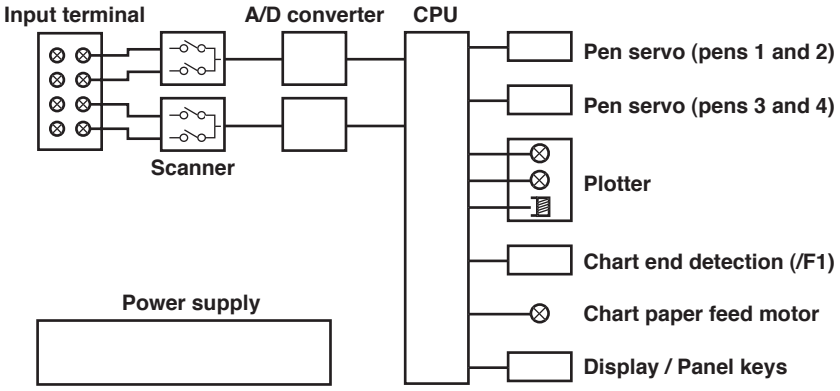
1.1 Principles of Operation

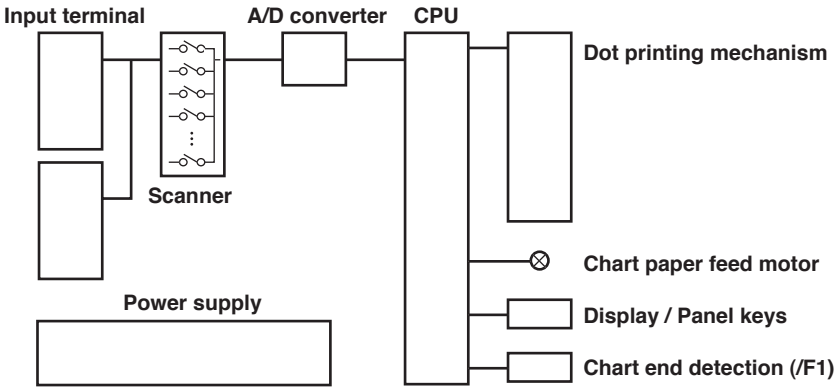
Block Diagram

The following explains the principles of operation of the μR20000.

Block Diagram (Pen Model)



Block Diagram (Dot Model)



Input Terminal

For connecting the measurement input signal wires. The terminals can be used for DC voltage, thermocouple, resistance temperature measurement, and contact input.

- The reference junction compensation circuit for thermocouples is built in.
- Proven transistor method used for measuring the temperature of the terminals.
- Metal core construction used in the internal printed circuit boards to equalize temperature.
- Input terminals removable.

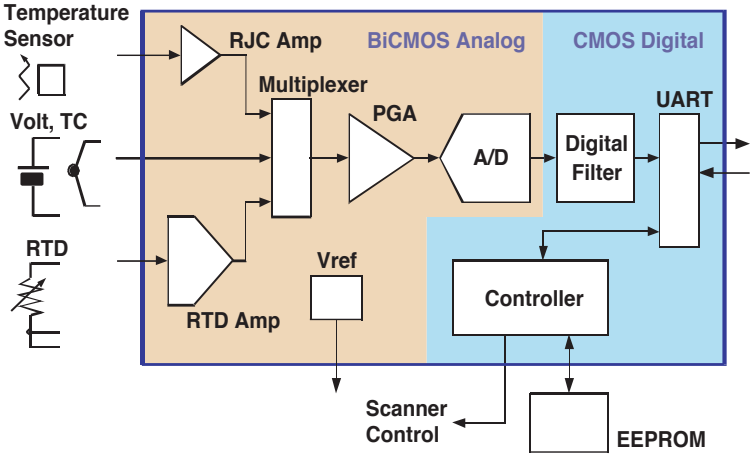
Scanner

Switches the measured input signal (channel). The input signal switching section uses highly reliable solid state relays (SSR).
The pen models use two A/D converter, one is for channels 1 and 2, the other for channels 3 and 4.
On the dot model, all channels are driven by one A/D converter.

A/D Converter

ASIC

Uses a proprietary one-chip ASIC. The ASIC is a combination analog/digital IC that contains popular CMOS processes. The table below shows its configuration.



- **Controller**
  Controls switching of the input signal by the scanner, and switching of the A/D converter attenuator and RTD/TC mode.
- **PGA (programmable gain amplifier)**
  Programmable amplifier with a gain of 1 to 100 times.
- **A/D**
  Converts analog signals to digital signals. Uses a pulse width modulation-based integrating A/D converter that suppresses the effects of noise on the input signal. With dot models, data is converted from the 6 channel per second model and the 12 to 24 channels per 2.5 seconds model.
- **UART (Universal Asynchronous Receiver-Transmitter)**
  Performs serial communications with the CPU via a photocoupler.

EEPROM

Stores data modified by the A/D converter.

Pen Servo (Pen Model)

Balances the pen in the recording position.

- Uses a compact, lightweight motor with a photoencoder.
- The motor is attached to the pen carriage, and moves with the pen.
- The revolution of the motor is controlled by PWM signals from the CPU.

Plotter (Pen Model)

The pen model includes an XY plotter for printing. The plotter consists of an X-axis motor positioned in the plotter assembly, the Y-axis motor installed in the carriage, and a solenoid for moving the pen up and down.

Printing Mechanism (Dot Model)

Uses a field-proven six-color wire dot printing system. Also, follows a raster scan method* that helps maintain the life-span of the drive train wire. It consists of a driver board, carriage motor, ribbon shift motor, and other components.

* The printing carriage moves in alternation from left to right and right to left every recording interval, and prints measured values. When the printing carriage moves from left to right, measured values are printed in the appropriate order starting on the left. When the printing carriage moves from right to left, measured values are printed in the appropriate order starting on the right.

Display / Panel Keys

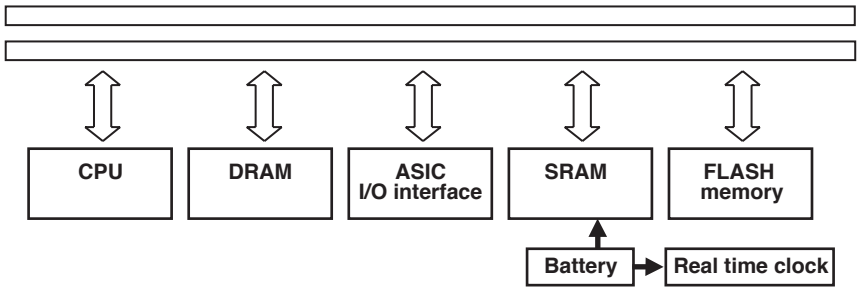
- Offers a variety of display types, with a fluorescent character display tube (VFD) of 181 dots (horizontal) x 16 dots (vertical).
- Seven keys are available for operation and settings.
- White LEDs are installed for illuminating the z-fold chart paper. The LED can be replaced.

Power Supply

A universal type power supply unit supplying a voltage of 100 V to 240 VAC at a frequency of 50/60 Hz. The fuse is built in and cannot be replaced.
Instruments with the /P1 option support 24 VDC/AC (50/60 Hz), but cannot be used at 100 V to 240 VAC (50/60 Hz).

CPU

The following diagram shows the structure of the CPU Assembly.



- **FLASH memory**
  The following are saved on the Flash ROM.
  - Programs
  - Ribbon shift adjustment data (dot model)
  - Pen servo adjustment data (pen model)
  - The mac address and related data
  - System configuration data
- **SRAM**
  The following are saved on the SRAM.
  Data deleted in the RAM Clear process (backed up by battery)
  - Zero/Span position
  - Hysteresis adjustment data (dot model)

  Data deleted in the RAM Clear process
  - User settings (input range, etc.)
- **Battery**
  A lithium battery. Backs up the SRAM and real time clock.
- **ASIC**
  Contains interface functions for the motor and actuator, A/D converter, display, panel key, and other items. Controls the pen servo mechanism.
- **CPU and DRAM**
  Firmware is installed from flash memory to the DRAM. The CPU operates according to the program in the DRAM.

2.1 Failure Analysis and Repair Procedures

This section describes failure analysis and repair procedures.

Failure Analysis Procedures

1. Determine the type of problem.
2. Check for possible user error. Check the connections and the settings of equipment to determine whether there was a handling mistake.
3. Execute the self diagnostic test by turning the power ON, and identify any problem items.
4. Analyze the cause of the problem according to the troubleshooting flow chart.

WARNING

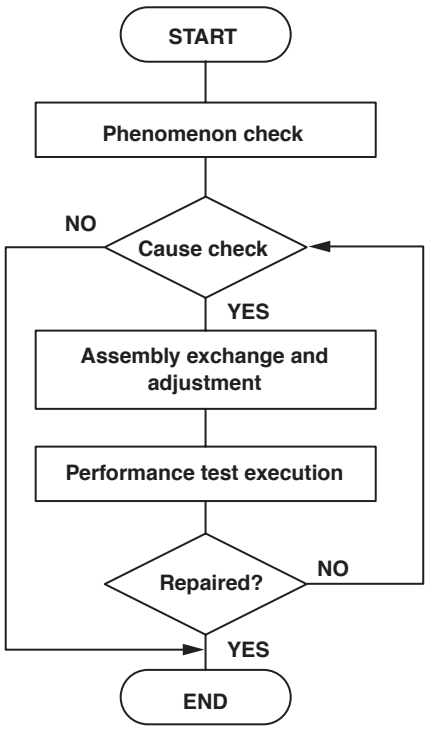
Do not touch the circuit or parts with live voltage because the power unit contains a high-voltage electrical circuit. The power unit is furnished with a dedicated cover to prevent electric shock. Do not remove this cover. Never touch any part not subject to adjustment.

CAUTION

Make sure to connect input terminals (voltage or current) correctly. The internal circuit may be damaged when wrongly connected.

Flow Chart

This flow chart consists of general service operations when a fault occurs. This chart is not always suitable for every kind of fault. However, it is recommended to perform operations according to the flow chart.



2.2 Failures and Corrective Actions

The table below describes the most common types of failures and their corrective actions.

No.	Phenomenon	Action			Description	Refer to chapter 6	
		Check	Adjust	Replace		Page	Item
1	No power	✓			Condition of power supply connection Power supply voltage	-	-
					Peripheral wiring of the CPU Assembly	6-8 6-22	24 22
				✓	Power Assembly	6-8 6-22	21 17
					CPU Assembly	6-8 6-22	24 22
					Other Assemblies (power supply part short)	-	-
2	Fail display (option /F1)			✓	CPU Assembly	6-8 6-22	24 22
3	Date/time is initialized	✓			Voltage and connection of Battery Assembly	-	-
				✓	CPU Assembly	6-8 6-22	24 22
					Battery Assembly	6-8 6-22	15 16
4	Problem with key operation	✓			Turning OFF the key lock function	-	-
					FPC connection between Display Assembly and Pen/Dot Driver PCB	6-4, 5 6-18, 19	1 1
				✓	Display Assembly	6-4, 18	1
5	Problem with display	✓			FPC connection between Display Assembly and Pen/Dot Driver PCB	6-4, 5 6-18, 19	1 1
				✓	Display Assembly	6-4, 18	1
6	**(Pen Model)** Pen recording quality poor	✓			Pen axis load, condition of shaft, abnormal noises, etc.	-	-
			✓		Adjust the recording position.	-	-
				✓	Pen Servo Assembly	6-6	2
7	**(Pen Model)** Pen does not move Error message (Error: 963)-> PEN1 Error message (Error: 964)-> PEN2 Error message (Error: 965)-> PEN3 Error message (Error: 966)-> PEN4	✓			Check whether the recorder has started, as well as the pen axis load, abnormal noises, etc.	-	-
					FPC connection between Pen Servo Assembly and Pen Servo PCB	6-6	2, 18
					FPC connection between Pen Servo PCB and Pen Driver PCB	6-5 6-6	1 18
				✓	Pen Servo Assembly	6-6	2
					Pen Servo PCB	6-6	18
					Pen Driver PCB	6-5	1
8	**(Dot Model)** Printer does not function. Printer error message (Error: 961)	✓			Wiring the Carriage Motor Assembly	6-20	10
				✓	Dot Driver PCB	6-19	1
					Carriage Motor Assembly	6-20	10
9	**(Dot Model)** Printer carriage moves, but the home position (zero position) is not detected. Printer error message (Error: 961)	✓			Printer carriage load, noises, etc.	-	-
				✓	Home position sensor	6-20	24
					Dot Driver PCB	6-19	1
					Carriage Motor Assembly	6-20	10

No.	Phenomenon	Action			Description	Refer to chapter 6	
		Check	Adjust	Replace		Page	Item
10	**(Dot Model)** Printer carriage does not move.	✓			Whether the recorder has started, carriage load, abnormal noises, etc.	-	-
				✓	Carriage Motor Assembly	6-20	10
					Dot Driver PCB	6-19	1
11	**(Dot Model)** Ribbon error message (Error: 960)	✓			Load check	-	-
					Whether the gears mesh correctly.	-	-
				✓	Ribbon Shift Motor Assembly (Ribbon Swing Motor Assembly)	6-19	8
12	**(Dot Model)** Ribbon does not feed.	✓			Is ribbon cassette installed correctly? Do the gears mesh correctly?	-	-
				✓	Ribbon Feed Motor Assembly	6-20	22
13	**(Dot Model)** Printed colors bleed.		✓		Adjust the ink ribbon	-	-
14	**(Dot Model)** Trend recording not normal.		✓		Adjust the recording position	-	-
15	**(Dot Model)** Print quality poor		✓		Adjusting the hysteresis	-	-
16	**(Dot Model)** Does not print.	✓			Does the ribbon feed?	-	-
					Does the Carriage Assembly wire dot head operate?	-	-
				✓	Carriage Assembly	6-20	24
					Dot Driver PCB	6-19	1
17	Chart paper does not feed.	✓			Is the chart installed correctly? Do the gears mesh correctly?	-	-
				✓	Chart Feed Motor Assembly	6-19	15
					Pen/Dot Driver PCB	6-5, 19	1
18	Internal illumination dim.		✓		Ajusting the brightness of the Internal light LED	-	-
				✓	LED Assembly	6-4, 18	2
19	Internal illumination does not turn ON.			✓	LED Assembly	6-4, 18	2
					Display Assembly	6-4, 18	1
20	The measured value is not correct	✓			Input section wiring Noise effects	-	-
21	Measured values fluctuate.	✓			Is the Integral Time setting of the A/D converter correct? Noise effects	-	-
				✓	Scanner PCB	6-8 6-22	17 32,33
22	Voltage measurement is good, but temperature measurement is not correct.	✓			Is the Reference Junction Compensation setting correct? Is the terminal cover installed?	-	-
				✓	Input Terminal Assembly (RJC Board)	6-10 6-24	17 25,28 31,34
					A/D Board PCB	6-8 6-22	16 29

3.1 Acceptance Test

This section describes the procedure to perform the acceptance test.

1. Read the preface to the user's manual, "Checking the Contents of the Package" and verify that you have all of the contents.
2. Make sure to understand the operating procedures as described in the user's manual.
3. Check each function using the user's manual.
4. Read and implement section 3.2, "Self Diagnostic Test."
5. Read and implement section 3.3, "Performance Test."

3.2 Self Diagnostic Test

The recorder is provided with complete self diagnostic functions to enhance reliability in measurement and serviceability.
When you turn ON the power, the recorder will automatically execute the following types of diagnoses alternately and display the results. After these tests are completed, the recorder is ready for use.

1. Main program (Flash ROM) test
2. Main RAM write/read test
3. A/D and A/D EEPROM test
4. Memory acquisition test (write test from Flash)
5. Mechanical system test
6. Ethernet module test

The table below shows the results of the self diagnostic tests when a problem is detected.

Error display		Possible Cause
B3	secondary copy error.	Problem with CPU Assembly
B4	Flash Device error.	
B5	Flash SUM error.	
B6	Flash Data error.	
902	RAM failure.	
910	A/D error.	Problem around the A/D Board PCB or EEPROM
951	EEPROM write error.	
921	A/D calibration value error.	Problem with the A/D Board PCB or wrong adjustment data value for the A/D Board PCB.
922	A/D calibration is in the wrong order.	
930	Memory acquisition failure.	Problem with CPU Assembly
940	The ethernet module is down.	Problem with the COMM PCB or CPU Assembly
950	A/D number error.	Problem with the A/D Board PCB (installation of the A/D Board PCB out of spec)
960	Ribbon error.	**(Dot model)** Problem with the ribbon shift mechanism or Dot CPU Assembly
961	Printer error.	**(Dot model)** Abnormal movement of the printing carriage or problem with the Dot CPU Assembly
962	Plotter error.	**(Pen model)** Problem with Pen CPU Assembly
963	Pen 1 error.	**(Pen model)** Abnormal movement of the Pen Servo Assembly or problem with the Pen CPU Assembly
964	Pen 2 error.	
965	Pen 3 error.	
966	Pen 4 error.	

3.3 Performance Tests

Read the warning and cautions below before beginning tests.

WARNING

- Circuit patterns of the printed circuit board are exposed. Be careful when handling so that hands or fingers are not injured by the protruding pins.

CAUTION

- Circuit patterns of the printed circuit board are exposed. If other metallic materials touch these patterns, electrical shorting will occur, causing the circuit to be damaged or burnt.
- It is sometimes necessary to turn the recorder upside down for adjustment. Do not drop the instrument, or allow it to fall over.

Test Environment

Item	Conditions
Ambient temperature	23 ± 5°C
Relative humidity	55 ± 20%
Atmospheric pressure	86 kPa-106 kPa
Power supply voltage	Nominal voltage ±1%
Power supply frequency	Nominal frequency ±1%
Power supply waveform	Distortion factor of 5% or less
DC power supply ripple	Content ratio of 0.1% or less
Vibration	A value having negligible effects on the instrument
Position	Within ±3% of the specified position
Interference*1	A value that does not affect the measured results
Electrical field	A value that does not affect the measured results
Magnetic field	A value that does not affect the measured results
Atmospheric pollutants	Levels of corrosive gasses, vapors, salts, and dust that do not affect the measured results.
Other external effects*2	A value that does not affect the measured results

*1 *Interference* refers to common mode noise, series mode noise, power supply noise, and other phenomena in the signal line.
*2 Other external effects include luminance, draft, ultrasonic waves, and radiation.

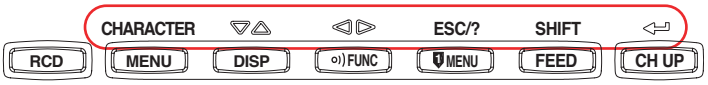
Test Instruments

Instrument	Specifications
DC voltage generator	Accuracy: ±0.01% of setting or better
DMM	Accuracy: ±0.01% of rdg or better
Variable resistors	Accuracy: 0.01% + 2 mΩ or better
Insulation tester	500 VDC
Withstand voltage tester	1 k to 1.5 kVAC
Glass scale	185 mm or more

Key Operations on the Recorder

The recorder has the following modes. The following is an explanation of how to enter and exit each mode.

- **Operation Mode**
  The mode in which the instrument is operated. The instrument enters this mode when the power is turned ON.
- **Setting Mode**
  This mode is for entering the input range, alarms, and other settings.
  - Hold down the MENU key for three seconds or longer while in operation mode to enter this mode.
  - To return to operation mode, hold down the MENU key for three seconds again.
  - In this mode, the functions of the keys are those printed above the keys in characters and symbols.



- **Basic Setting Mode**
  This mode is for setting up the thermocouple burnout function, action of alarm output relays, and other of the recorder's basic specifications.
  - To enter this basic setting mode, hold down the DISP key and the FUNC key for three seconds or longer while in setting mode. In this mode, the functions of the keys are those printed above the keys in characters and symbols.
  - To exit basic setting mode, display **Basic = End** then press the ↵ key. Choose **Store** or **Abort** in the **End =** screen, and press the ↵ key. If you choose Store, the settings are applied and the instrument returns to operation mode. If you choose Abort, the settings are canceled and the instrument returns to operation mode.

Note

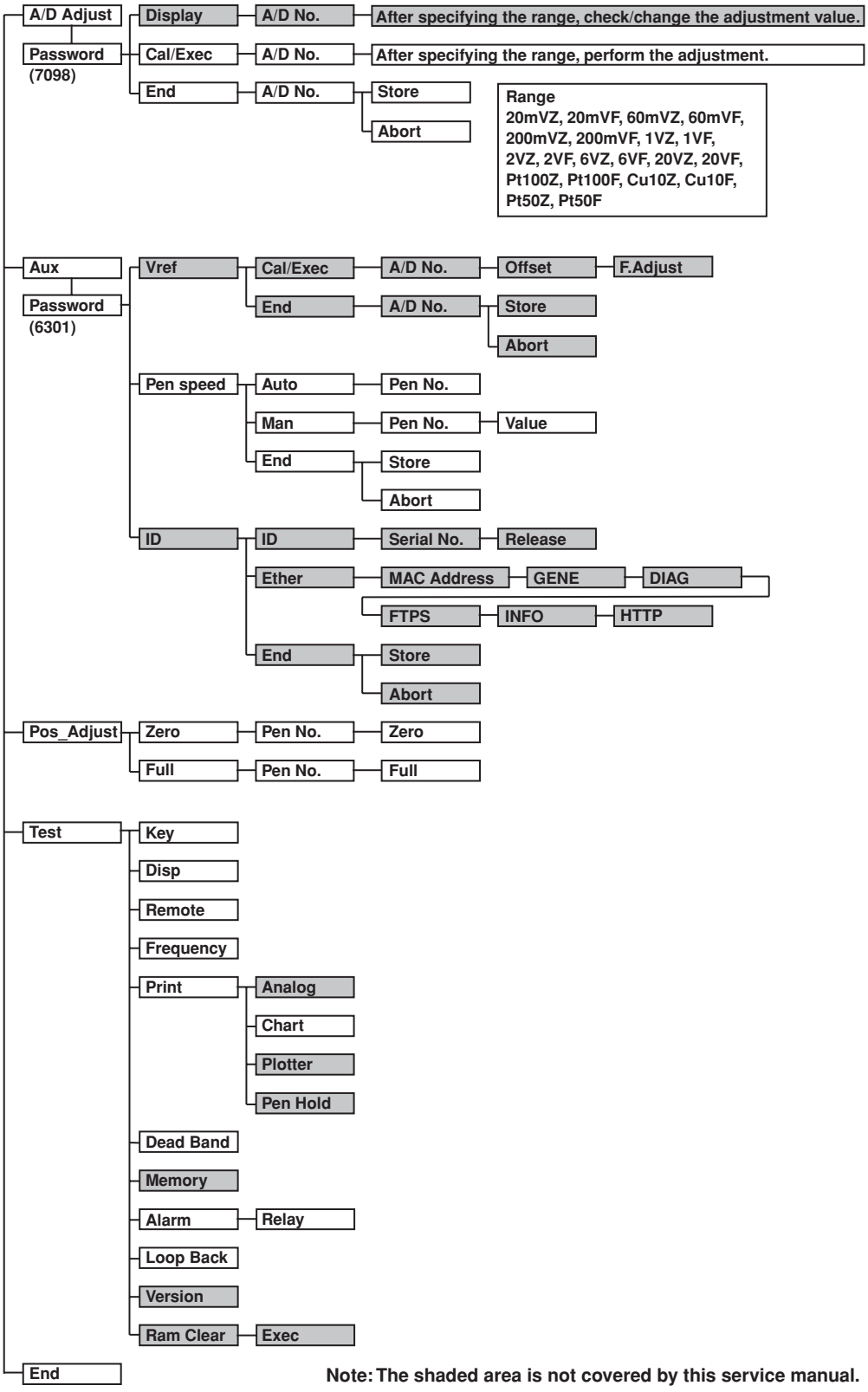
For operating procedures in setting mode and basic setting mode, see the μR20000 Recorder User's Manual (IM04P02B01-01E).

- **Test/Adjustment Mode**
  The mode in which the instrument is adjusted and tested.
  - Enter this mode by pressing the MENU and CH UP keys while turning ON the power. The Test/Adjustment Mode menu is displayed. In this mode, the functions of the keys are those printed above the keys in characters and symbols.
  - To return to operation mode, display **Menu = End** then press the ↵ key.
  - The following shows the structure of Test/Adjustment Mode. The shaded area is not covered by this service manual.

CAUTION

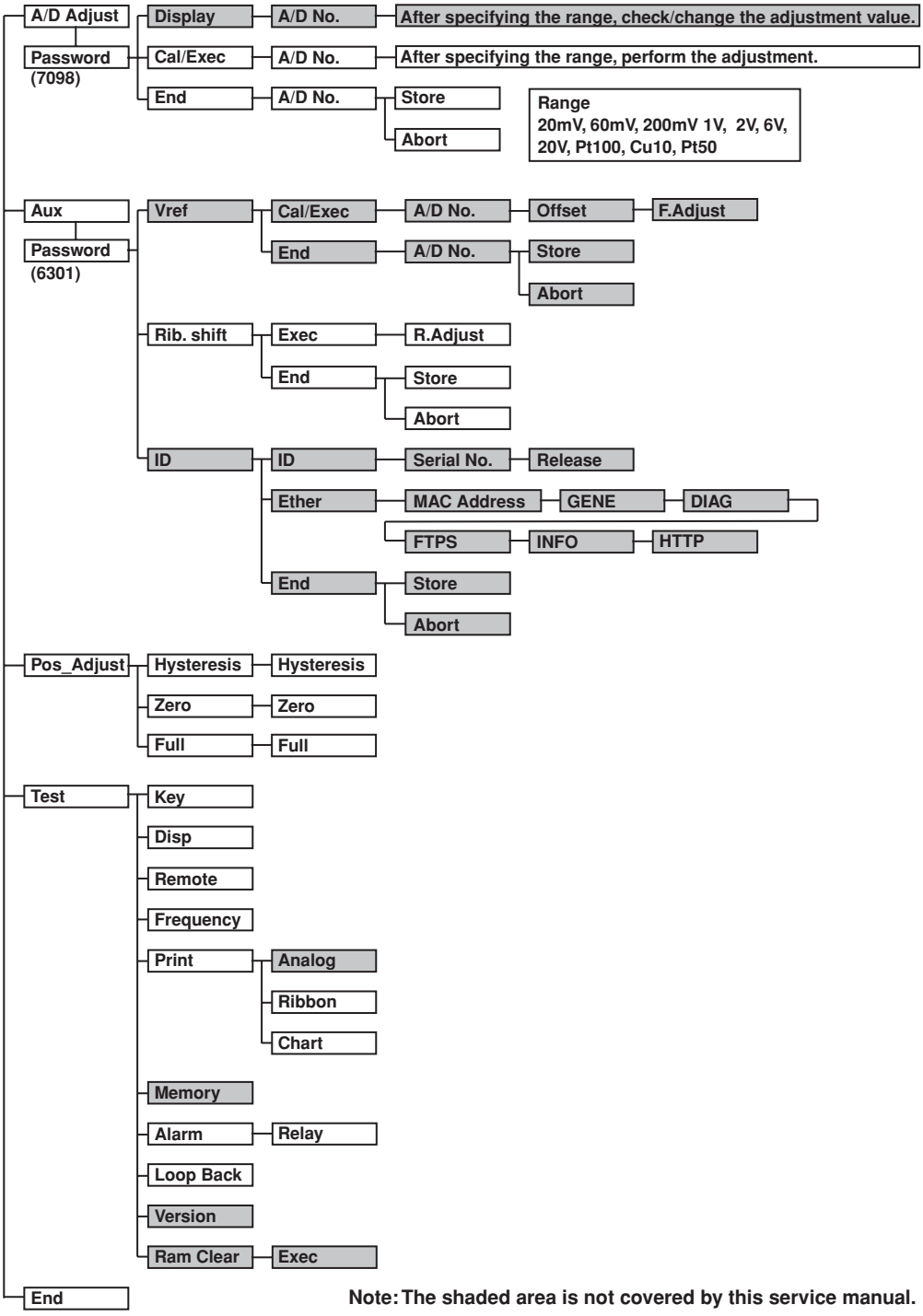
Do not enter settings in Test/Adjustment Mode that are not specified by this manual. Changing the settings can result in incorrect operation of the instrument.

The Test/Adjustment Mode Menu (Pen Model)



Note: The shaded area is not covered by this service manual.

The Test/Adjustment Mode Menu (Dot Model)



Note: The shaded area is not covered by this service manual.

Tests

The following is a list of the tests of the μR20000.

- Insulation Resistance
- Protective Grounding
- Withstand Voltage
- Measurement Accuracy
- Channel-to-Channel Error
- Burnout Detection
- Reference Junction Compensation Accuracy
- Display
- Key
- Power Supply Frequency Detection
- Battery Backup
- Recording Accuracy
- Z-Fold Chart Paper Feed Accuracy
- Dead Band (Pen Model)
- Pen Offset (Pen Model)
- Ink Bleed (Dot Model)
- Overscale Amount
- Relay Contact Output
- Remote Control Input
- Loop Back Test
- Z-Fold Chart End Detection
- Other Functions in Test Mode

3.4 Test Procedures

Insulation Resistance

● **Procedures**

Perform a measurement with an insulation tester and check whether the results meet the criteria. Perform the measurement with the power switch turned ON.

Criteria

Terminals Measured	Criteria	Condition
Between the power and earth terminals	100 MΩ or more	Short the L and N terminals.
Between the input and earth terminals	100 MΩ or more	Short all input terminals.
Between input terminals	100 MΩ or more	Short the odd and even channels of the +/A, –/B, and b* terminals, and measure between odd and even channels.
Between the relay contact output terminals and earth terminals	100 MΩ or more	With the /A1, /A2, /A3, /A4, /A5, or /F1 option. Short all relay contact output terminals.
Between remote control input C terminal and earth terminals	100 MΩ or more	With the /R1 option.
Between the RS-422A/485 SG terminals and earth terminals	100 MΩ or more	With the /C3 option.
Between the Ethernet terminal and earth terminals.	100 MΩ or more	With the /C7 option. Short all input/output terminals

* With the dot model without the /N2 option, exclude the b terminal. The b terminals are connected to all channels.

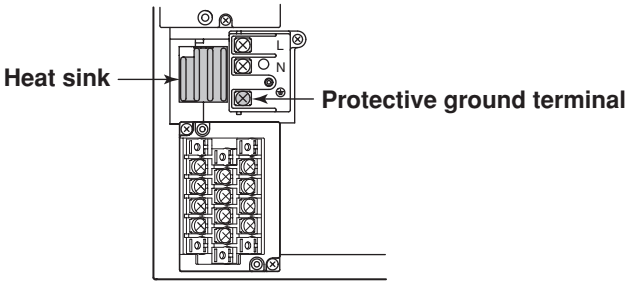
Protective Grounding

● **Procedures**

Perform a resistance measurement with a DMM (Digital Multi Meter), and check whether the results meet the criterion.

Criterion

Measured Location	Criterion
Between earth terminal and power supply heat sink	0.2 Ω or less



Withstand Voltage

● **Procedures**

Perform the test with a withstanding voltage tester, and check whether the results meet the criteria. Perform the measurement with the power switch turned ON.

Test Duration

The test duration is one minute.

Criteria

Tested Terminals	Applied Voltage	Max Allowable Leak Current	Condition
Between the power and earth terminals	1.5 kVAC*1	5 mA	Short the L and N terminals.
Between the input and earth terminals	1.0 kVAC	1 mA	Short all input terminals.
Between input terminals	1.0 kVAC	1 mA	Short the odd and even channels of the +/A, –/B, and b*2 terminals, and measure between odd and even channels.
Between the relay contact output terminals and earth terminals	1.5 kVAC	1 mA	With the /A1, /A2, /A3, /A4, /A5, or /F1 option. Short all relay contact output terminals.
Between remote control input C terminal and earth terminals	500 VDC	0.1 mA	With the /R1 option.

*1 With the /P1 option, the applied voltage is 1.0 kVAC.
*2 With the dot model without the /N2 option, exclude the b terminal. The b terminals are connected to all channels.

Measurement Accuracy

● **Overview**

Tests the measuring accuracy of the recorder. The measurement accuracy test is performed in one of the following ways.

- One representative channel* for each A/D converter is tested, and the channel-to-channel error between the representative channel and other channels is tested (see next item).
  * The pen model uses one A/D converter (A/D 1) for both channels 1 and 2, and another (A/D 2) for both channels 3 and 4. Choose channel 1 or 2 to test A/D 1, and channel 3 or 4 to test A/D 2.
    The dot model uses a single A/D converter for channels 1 through 24. Choose any one of channels 1 through 24 to test the A/D converter.
- The measuring accuracy of all channels is tested separately.

● **Test Instruments**

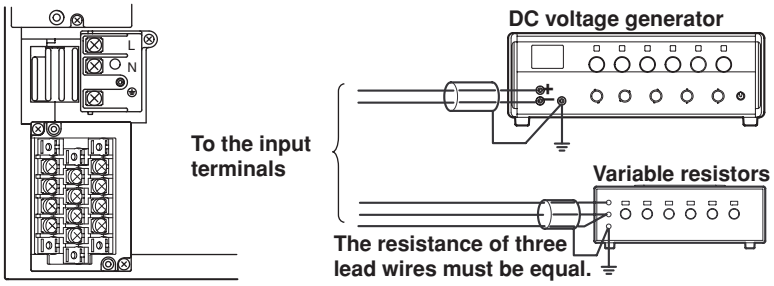
Instrument	Specifications
DC voltage generator	Accuracy: ±0.01% of setting or better
DMM	Accuracy: ±0.01% of rdg or better
Variable resistors	Accuracy: 0.01% + 2 mΩ or better

● **Recorder Settings**

Set the input range of the channels under test to the test range.

● **Procedures**

Warm up the instrument for thirty minutes before performing the test. Set the ranges on the recorder, and input the values determined for each range. Check whether the displayed measured values meet the criteria.



Criteria

Range	Input Range	Allowed by Test	Accuracy Specification	Remarks
20mV	+20 mV	±3 digits	±(0.1% of rdgs + 2digits)	
	0 mV	±1 digits		
	−20 mV	±3 digits		
60mV	+60 mV	±6 digits		
	0 mV	±1 digits		
	−60 mV	±6 digits		
200mV	+200 mV	±3 digits		
	0 mV	±1 digits		
	−200 mV	±3 digits		
2V	+2 V	±3 digits		
	+1 V	±2 digits		
	0 V	±1 digits		
	−1 V	±2 digits		
	−2	±3 digits		
6V	+6 V	±6 digits		
	0 V	±1 digits		
	−6 V	±6 digits		
20V	+20 V	±3 digits		
	0 V	±1 digits		
	−20 V	±3 digits		
50V	+50 V	±5 digits	±(0.1% of rdgs + 3 digits)	
	0 V	±2 digits		
	−50 V	±5 digits		
Pt100	−200°C: 18.52 Ω	±0.4°C	±(0.15% of rdgs + 0.3°C)	
	0°C: 100 Ω	±0.2°C		
	600°C: 313.71 Ω	±0.9°C		
TC-T	0 mV	±0.2°C		EXT RJC mode
TC-K	0 mV	±0.3°C		EXT RJC mode
Cu10 (GE)	−200°C: 1.326 Ω	±1.4°C	±(0.4% of rdgs + 1.0°C)	Performed when the /N1 option is specified.
	0°C: 9.036 Ω	±0.8°C		
	300°C: 20.601 Ω	±1.7°C		
Pt50	−200°C: 8.57 Ω	±0.8°C	±(0.3% of rdgs + 0.6°C)	Performed when the /N3 option is specified.
	0°C: 50 Ω	±0.4°C		
	600°C: 158.64 Ω	±0.9°C		

Channel-to-Channel Error

● **Procedures**

Pen Model

Assign inputs as shown in the table below in parallel to channels 1 and 2, and check whether the measured values on both channels meets the criteria. Perform the same test using channels 3 and 4.

Criteria

Range	Input	Criteria
20 mV	Short +/A and –/B	0.00 ±0.01 mV
Pt100	103.9 Ω	10 ±0.2°C, between channel dispersion within 0.2°C

Dot Model

Assign inputs as shown in the above table in parallel to all channels, and check whether the measured values on each channel meet the test criteria in the table above.

* The b terminal of the resistance temperature detector input is connected internally. However, when option /N2 is specified, the b terminal is isolated at each channel.

Burnout Detection

● **Procedures**

The test is performed on a representative channel* from each A/D converter. Set up the burnout detection function on the recorder in advance.

* On a four-pen model for example, perform the test on channel 1 and channel 3. On a dot model, check an arbitrary channel.

Check the action in the following cases.

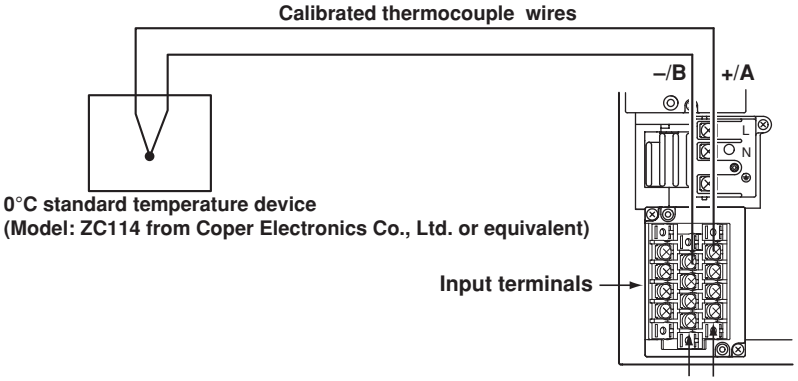
- Connect 2 kΩ between the channel's +/A terminal and –/B terminal. Set that channel's thermocouple type to K and check that a value close to room temperature is displayed.
- Connect 82 kΩ and 0.1 μF in parallel between the channel's +/A terminal and –/B terminals. Set that channel's thermocouple type to K and check that the displayed value is "B. out."

Reference Junction Compensation Accuracy

● **Procedures**

Set all channels to thermocouple type T. Measure 0°C on one of the channels and check that the display is within the criteria below.

Criterion: 0.3°C to −0.4°C



- Use a calibrated thermocouple, and wires of 0.5 diameter or less without a terminal chip. Also, pay attention to the measurement accuracy.
- Monitor the 0°C standardized temperature bath at all times, and confirm that it is within 0°C ±0.01°C.
- When using a 0°C standard temperature device, the tip of the thermocouple floats 10 mm off the bottom.
- Perform the test in a stable environment. If drafts are present and may influence the results, position the equipment to avoid them.
- After connecting the thermocouple, allow a warm-up time of 30 minutes or more before beginning measurement.
- Always use terminal covers.
- When measuring, filters may be applied.

Display

● **Procedures**

1. Turn ON the power switch while pressing the MENU and CH UP keys. **Menu = A/D Adjust** is displayed.
2. Select **Menu = Test**, and press the ⏎ key.
3. Choose **Test = Disp** and press the ⏎ key.
   The test pattern is displayed. Each time you press the DISP key the display pattern changes. For each pattern, check that there are no missing parts, abnormalities, or other defects. Press the ESC/? key to return to the Test = Disp screen.

* Select using the ▽△ key. You can hold down the **SHIFT** key while pressing ▽△ key to reverse the key's action.

● **Displayed Pattern**

- All pixels lit: status display also lit
- All pixels not lit
- Horizontal stripes: 2 pixels each lit/not lit
- Vertical stripes: 2 pixels each lit/not lit

Keys

● **Procedures**

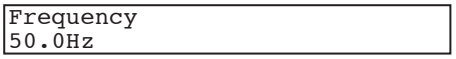
1. Turn ON the power switch while pressing the MENU and CH UP keys. **Menu = A/D Adjust** is displayed.
2. Select **Menu = Test**, and press the ↵ key.
3. Choose **Test = Key** and press the ↵ key.
   Confirm that the appropriate box turns On or OFF when each key is pressed.
   The box of the display corresponds to the order of the keys.
   Press the ESC/? key twice to return to the Test = Key screen.

* Select using the ▽△ key. You can hold down the **SHIFT** key while pressing ▽△ key to reverse the key's action.

Power Supply Frequency Detection

● **Procedures**

1. Turn ON the power switch while pressing the MENU and CH UP keys. **Menu = A/D Adjust** is displayed.
2. Select **Menu = Test**, and press the ↵ key.
3. Choose **Test = Frequency** and press the ↵ key.
   The detected power supply frequency is displayed. Confirm that it matches the actual power supply frequency.



* Select using the ▽△ key. You can hold down the **SHIFT** key while pressing ▽△ key to reverse the key's action.

Battery Backup

● **Procedures**

1. Set the date and time on the recorder. Also, set an arbitrary channel to the 20 mV range.
2. Turn OFF the power switch.
3. Turn ON the power after approximately one minute, then check that the set date, time, and range are not initialized.

Recording Accuracy

● **Overview**

Set the channels to the 2 V range and confirm that the recording accuracy is within the criteria.

Pen Model

Check the accuracy of all pens. Use standard pens (or equivalent).

* A "standard pen" is one whose tip does not fluctuate more than ±0.1 mm.

Dot Model

Check an arbitrary channel.

● **Recorder Settings**

Set the input to the 2 V range, and –2.000 V to 2.000 V.

● **Procedures**

Input values equivalent to 0, 25, 50, 75, and 100%, and record.

Measure the recorded results using a Glass scale (or equivalent), then confirm that the results meet the criteria below.

Criteria

Input	Criteria
–2 V	0 ±0.5 mm
–1 V	45 ±0.5 mm
0 V	90 ±0.5 mm
1 V	135 ±0.5 mm
2 V	180 ±0.5 mm

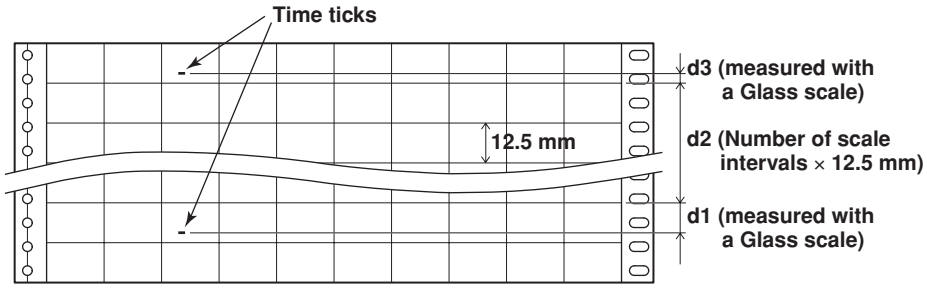
Note

These criteria do not include the measurement accuracy. When taking the measurement accuracy into account, the criteria are measurement accuracy ±0.5 mm.

Z-Fold Chart Paper Feed Accuracy

● **Procedures**

1. Turn ON the power switch while pressing the MENU and CH UP keys. **Menu = A/D Adjust** is displayed.
2. Select **Menu = Test**, and press the ↵ key.
3. Choose **Test = Print** and press the ↵ key.
4. Select **Menu = Chart**, and press the ↵ key.
   The recorder starts feeding paper, then stops after approximately 500 mm. Time ticks are printed between the start and stop of paper feeding. Check that the space between the two time ticks (d1 + d2 + d3 in the figure below) satisfies the criterion below. Measure using a Glass scale (or equivalent).
   Criterion: 500 ±0.4 mm



* Select using the ▽△ key. You can hold down the **SHIFT** key while pressing ▽△ key to reverse the key's action.

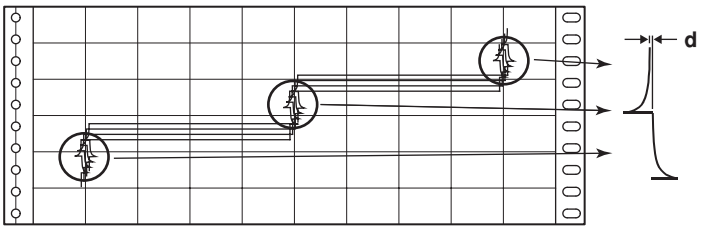
Dead Band (Pen Model)

● **Procedures**

Check the accuracy of all pens. Use standard pens (or equivalent).

* A “standard pen” is one whose tip does not fluctuate more than ±0.1 mm.

1. Turn ON the power switch while pressing the MENU and CH UP keys. **Menu = A/D Adjust** is displayed.
2. Select **Menu = Test**, and press the ↵ key.
3. Choose **Test = Dead Band** and press the ↵ key.
   The dead band measurement pattern is automatically recorded near 0%, 50%, and 100%. Measure the following portions of the recorded results using a Glass scale (or equivalent), then confirm that the results meet the criteria.
   Criterion: 0.36 mm or less



* Select using the ▽△ key. You can hold down the **SHIFT** key while pressing ▽△ key to reverse the key’s action.

Pen Offset (Pen Model)

● **Procedures**

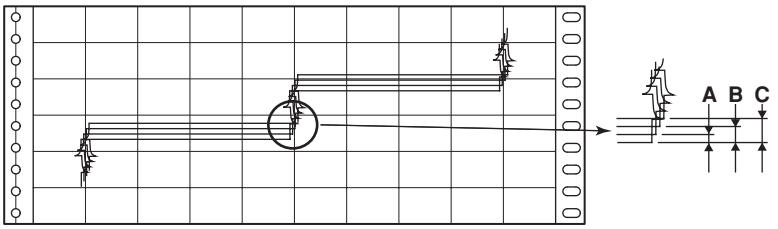
Check all pens. Use standard pens (or equivalent).

* A “standard pen” is one whose tip does not fluctuate more than ±0.1 mm.

1. Turn ON the power switch while pressing the MENU and CH UP keys. **Menu = A/D Adjust** is displayed.
2. Select **Menu = Test**, and press the ↵ key.
3. Choose **Test = Dead Band** and press the ↵ key.
   The dead band measurement pattern is automatically recorded near 0%, 50%, and 100%.
   Measure the following portions of the recorded results using a Glass scale (or equivalent), then confirm that the results meet the criteria.

Criteria

Item	Criteria
A	2.1 ±1 mm
B	4.2 ±1 mm
C	6.3 ±1 mm

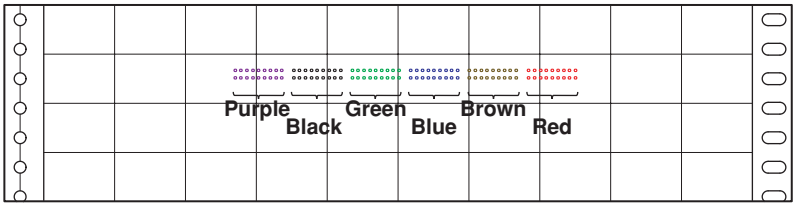


* Select using the ▽△ key. You can hold down the **SHIFT** key while pressing ▽△ key to reverse the key’s action.

Ink Bleed (Dot Model)

● **Procedures**

1. Turn ON the power switch while pressing the MENU and CH UP keys. **Menu = A/D Adjust** is displayed.
2. Select **Menu = Test**, and press the ↵ key.
3. Choose **Test = Print** and press the ↵ key.
4. Select **Menu = Ribbon**, and press the ↵ key.
   Printing of six color test patterns begins. Confirm that the printed colors did not bleed.



* Select using the ▽△ key. You can hold down the **SHIFT** key while pressing ▽△ key to reverse the key's action.

Overscale Amount

● **Overview**

Pen Model

Check the accuracy of all pens. Use standard pens (or equivalent).

* A "standard pen" is one whose tip does not fluctuate more than ±0.1 mm.

Dot Model

Check an arbitrary channel.

● **Recorder Settings**

Set the input to the 2 V range, and –2.000 V to 2.000 V.

● **Procedures**

Input each value and record. Confirm that the recording position meets the criterion below.

Criteria

Input Value	Criteria
–2.3 V	That it was 0.5 mm or more on the left side relative to the Zero recording position
2.3 V	That it was 0.5 mm or more on the right side relative to the Full recording position

Relay Contact Output

● **Overview**

This test performed when the /A1, /A2, /A3, /A4, /A5, or /F1 option is specified. It is performed for all relay contact outputs.

● **Procedures**

1. Turn ON the power switch while pressing the MENU and CH UP keys. **Menu = A/D Adjust** is displayed.
2. Select **Menu = Test**, and press the ↵ key.
3. Choose **Test = Alarm** and press the ↵ key.
   The relay number selection screen (Relay=I01) appears.
4. Select a relay number and check the relay action according to the table below.

* Select using the ▽△ key. You can hold down the **SHIFT** key while pressing ▽△ key to reverse the key's action.

When the /F1 Option is Not Installed

Relay	Relay No.
I01-I06	I01-I06
I11-I16	I11-I16
I21-I26	I21-I26
I31-I36	I31-I36

When the /F1 Option Is Installed

Relay	Relay No.
I01-I06	I01-I06
I11-I16	I11-I16
Chart Paper End Output Relay	I25
FAIL Output Relay	FAIL

Output Relays Other Than the FAIL Output Rela

□Select the relay number to test and confirm that it is open between the NO and relay output terminals. Press the ↵ key. The relay is energized. Check that it i closed between relay output terminals NO and C.

FAIL Output Relay

Select FAIL in the relay number selection screen and confirm it is closed between relay output terminals NO and C. Press the ↵ key. The relay is deenergized approximately four seconds thereafter. Confirm that it is open between relay output terminals NO and C.

You cannot operate the recorder after execution of FAIL output relay test. Turn OFF the recorder, then turn it back ON again.

Remote Control Input

● **Overview**

This test is performed when the /R1 option is specified. It is performed for all remote control input terminals.

● **Procedures**

1. Turn ON the power switch while pressing the MENU and CH UP keys. **Menu = A/D Adjust** is displayed.
2. Select **Menu = Test**, and press the ↵ key.
3. Choose **Test = Remote** and press the ↵ key.
4. Connect the remote control input terminal under test to the C terminal and press the ↵ key.
   The remote control input terminal condition confirmation screen appears.
   Confirm that the display of the corresponding remote control input terminal is 1.

```
Remote Status
00000
```

5. Press the ESC/? key to return to the **Test = Remote** screen.
   Repeat the above steps 4 and 5 for all input terminals.

* Select using the ▽△ key. You can hold down the **SHIFT** key while pressing ▽△ key to reverse the key's action.

Loop Back Test (Ethernet Communication Interface, /C7)

● **Procedures**

This test performed when the /C7 option is specified.

1. Connect the recorder to the network.
2. Turn ON the power switch while pressing the MENU and CH UP keys. **Menu = A/D Adjust** is displayed.
3. Confirm that the indicator on the left of the Ethernet port on the recorder illuminates.
4. Choose **Menu = Test**, and press the ↵ key.
5. Choose **Test = Loop Back** and press the ↵ key.
   Confirm that **OK** is displayed. If **ERROR** is displayed, check the connection to the network.

* Select using the ▽△ key. You can hold down the **SHIFT** key while pressing ▽△ key to reverse the key's action.

Z-Fold Chart Paper End Detection

● **Procedures**

This test performed when the /F1 option is specified. Confirm the status below.

Status	Criterion
Chart paper present	The CHART END indicator is out
No chart paper present	The CHART END indicator illuminates

Other Functions in Test Mode

In addition to the tests described up to now, you can perform the following tests in test mode. They are not described in detail in this manual.

Menu	Description
Test > Print > Analog	Tests the analog recorder recording quality.
Test > Print > Plotter	Tests the plotter pen recording quality (pen model).
Test > Print > Pen Hold	Aligns the pens to the position when the recorder is shipped (pen model).
Test > Memory	Performs a test of the SRAM. The display for normal status is "0000."
Test > Version	Displays the firmware version.
Test > Ram Clear	Initializes the setup data, and returns to operation mode.

4.1 Before Making Adjustments

This chapter describes adjustments of the A/D converters, recording position, pen speed (pen model), and ink ribbon (dot model).

Environment

See section 3.3, “Test Environment.”

Operations on the Main Unit

See section 3.3, “Key Operations on the Recorder.”

Preparation

All adjustments are to be made after warming up the recorder for at least thirty minutes.

4.2 Adjustments to the Pen Model

Adjusting the A/D Converters

● **Overview**

Enter the value determined for each range, perform measurement, then write the adjusted values to the AD converter.

● **Instruments Used**

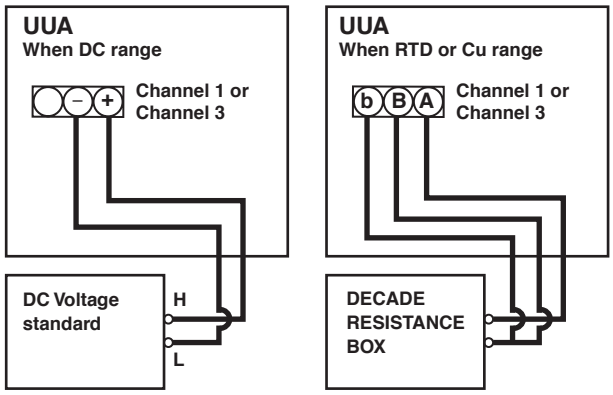
Instrument	Specifications
DC voltage generator	Accuracy: ±0.005% of setting + 1 μV or better
Resistors	10 Ω, 50 Ω, 100 Ω, 150 Ω, 300 Ω, Accuracy: 0.01% or better

● **Channel**

Adjustment of channels 1 and 2 is performed using channel 1, and adjustment of channels 3 and 4 is performed using channel 3.

● **Procedure**

Connection



UUA: Unit Under Adjustment

Input Value

Input Type	Range	Zero	Full	Description
DC voltage	20 mV	0 mV	20 mV	-
	60 mV	0 mV	60 mV	-
	200 mV	0 mV	200 mV	-
	1 V	0 mV	1 V	-
	2 V	0 mV	2 V	-
	6 V	0 mV	6 V	-
	20 V	0 mV	20 V	-
	50 V	No adjustment needed		-
RTD	Pt100	100 Ω	300 Ω	-
	Cu10	10 Ω	50 Ω	With the /N1 option.
	Pt50	50 Ω	150 Ω	With the /N3 option.

● **Procedure**

The following explains the procedure when working with channel 1.

1. Press the MENU and CH UP keys while turning ON the power. **Menu = A/D Adjust** is displayed.
2. With **Menu = A/D Adjust** is displayed, press the ↵ key.

   ```
   Menu=A/D Adjust
   ```

3. Input the password (see page 3-5).

   ```
   Password=
   ```

4. Select **Mode = Cal/Exec**, then press the ↵ key.

   ```
   Mode=Cal/Exec
   ```

5. Select **A/D No. = 1**, then press the ↵ key.
   * For channel 3, select A/D No. = 2.

   ```
   A/D No.=1
   ```

6. Select **Range = 20 mVZ**.

   ```
   Range=20mVZ
   ```

7. Enter the zero value for the 20 mV range, then press the ↵ key.
   After measurement, the adjusted value is displayed.

   ```
   Range=20mVZ
   Zero:-200
   ```

8. Press the ↵ key.
   You are returned to the **A/D No. =** screen.

9. Leave the A/D No. unchanged, then press the ↵ key.

   ```
   A/D No.=1
   ```

10. Select **Range = 20 mVF**, then press the ↵ key.

    ```
    Range=20mVF
    ```

11. Enter the Full value for the 20 mV range on channel 1, then press the ↵ key.
    After measurement, the adjusted value is displayed.

    ```
    Range=20mVF
    Full:32768
    ```

12. Repeat steps 5 to 11 to adjust the following ranges: 60 mV, 200 mV, 1 V, 2 V, 6 V, 20 V, Pt100, Cu10 (with the /N1 option).

Saving Adjusted Values

13. When all adjustments are finished, select **Mode = End**, then press the ↵ key.

    ```
    Mode=End
    ```

14. Select **A/D No. = 1**, then press the ↵ key.
    * You can select an A/D No. of 1, 2, or 1+2. The adjusted value is saved on the AD converter of the selected number.

    ```
    A/D No.=1
    ```

* Select using the ▽△ key. To enter numerical values, move the cursor to the entry point using the ◁ ▷ key. Select the value using the ▽△ key. You can hold down the **SHIFT** key while pressing ▽△ key or ◁ ▷ key to reverse the key's action.

15. With **End = Store** displayed, press the ↵ key.
    The adjusted value is saved to the A/D converter.

```
End=Store
```

Concluding Adjustments

16. Select **Menu = End**, then press the ↵ key. You are returned to the operation mode.

```
Menu=End
```

Adjusting the Pen Speed

● **Overview**

This is an adjustment to make the speed of the pen as it moves from left to right almost the same as when it moves from right to left. The recorder adjusts automatically. The adjustment is performed when the pen servo assembly is replaced.

● **Procedure**

1. Press the MENU and CH UP keys while turning ON the power. **Menu = A/D Adjust** is displayed.
2. Select **Menu = Aux**, then press the ↵ key.

```
Menu=Aux
```

3. Enter the password (see page 3-5), then press the ↵ key.

```
Password=
```

4. Select **Sub = Pen speed**, then press the ↵ key.

```
Sub=Pen speed
```

5. Select **Pen speed = Auto**, then press the ↵ key.

```
Pen speed=Auto
```

6. Select the pen to adjust, then press the ↵ key.
   The recorder performs the adjustment automatically and displays the results.

```
Pen No.=1
```

```
Value=9
38:37:1
```

Understanding the Results

- **Value = 9**
  The number showing the adjustment result. It is an integer from 0 to 20.
- **39:38:1**
  39: The time count required to move from 25% to 75%.
  38: The time count required to move from 75% to 25%.
  1: The difference between the two time counts above.
  Criteria
  Time count: Less than or equal to 50
  Difference between the two time counts: Less than or equal to 10% value of the time count whichever smaller

7. Press the ↵ key, then perform steps 5 and 6 on the installed pen.

* Select using the ▽△ key. To enter numerical values, move the cursor to the entry point using the ◁ ▷ key. Select the value using the ▽△ key. You can hold down the **SHIFT** key while pressing ▽△ key or ◁ ▷ key to reverse the key's action.

8. When all pen adjustments are finished, select **Mode = End**, then press the ↵ key.

```
Mode=End
```

9. With **End = Store** displayed, press the ↵ key.
   The adjusted value is saved.

```
End=Store
```

Concluding Adjustments

10. Select **Menu = End**, then press the ↵ key. You are returned to the operation mode.

```
Menu=End
```

Note

If **Error** is displayed in the adjustment results screen, this most likely indicates that the pen cannot move normally through the full scale. Check the operation of the pen, then perform the adjustment again.

Adjusting the Pen Position

● **Overview**

This is an adjustment of the pen position to make the recording position 0 to 180 mm. Each pen is adjusted individually. The adjustment is performed when the recording accuracy is outside the criterion, or when internal components have been replaced.

Conditions

- Use a standard pen (or equivalent).
  * A "standard pen" is one whose tip does not fluctuate more than ±0.1 mm.
- The adjustment matches the Zero position to the 0% position of the z-fold chart paper.
- It also aligns the Full position from the 0% of the z-fold chart paper to the 180 mm position.
- For measurement, use a Glass scale (or equivalent).

● **Criterion**

Adjustment criterion: within ±0.1 mm

● **Procedure**

1. Install the pen into the pen arm.
2. Press the [MENU] and [CH UP] keys while turning ON the power. **Menu = A/D Adjust** is displayed.
3. Select **Menu = Pos Adjust**, then press the ↵ key.
   The Zero/Full selection screen appears.

```
Menu=Pos Adjust
```

* Select using the ▽△ key. To enter numerical values, move the cursor to the entry point using the ◁ ▷ key. Select the value using the ▽△ key. You can hold down the **SHIFT** key while pressing ▽△ key or ◁ ▷ key to reverse the key's action.

Adjusting the Zero Position

4. Select **P_Adj = Zero**, then press the ↵ key.

```
P_Adj=Zero
```

5. Select the number of the pen to adjust, then press the ↵ key.
   The adjustment value input screen in displayed.

```
Pen No.=1
1-4
```

6. Adjust the numerical value so that the pen recorder position overlaps the 0% position of the z-fold chart paper.

```
Zero=42
0/70
```

7. When the adjustment is complete, press the ↵ key.
   You are returned to the Zero/Full selection screen.

Repeat steps 4 to 7 to adjust all pens.

Adjusting the Full Position

8. Select **P_Adj = Full**, then press the ↵ key.

```
P_Adj=Full
```

9. Select the number of the pen to adjust, then press the ↵ key.

```
Pen No.=1
1-4
```

10. Adjust the numerical value so that the pen recorder position is in alignment from the 0% position of the z-fold chart paper to the 180 mm position.

```
Full=2
-45/15(B:3026)
```

11. When the adjustment is complete, press the ↵ key.
    You are returned to the Zero/Full selection screen.

Repeat steps 8 to 11 to adjust all pens.

12 When all pen adjustments are finished, select **Mode = End**, then press the ↵ key.

```
Mode=End
```

13. With **End = Store** displayed, press the ↵ key.
    The adjusted value is saved.

```
End=Store
```

Concluding Adjustments

14. Select **Menu = End**, then press the ↵ key. You are returned to the operation mode.

```
Menu=End
```

* Select using the ▽△ key. To enter numerical values, move the cursor to the entry point using the ◁ ▷ key. Select the value using the ▽△ key. You can hold down the **SHIFT** key while pressing ▽△ key or ◁ ▷ key to reverse the key's action.

4.3 Adjustments to the Dot Model

Adjusting the A/D Converters

● Overview

Enter the value determined for each range, perform measurement, then write the adjusted values to the A/D converter.

● Instruments Used

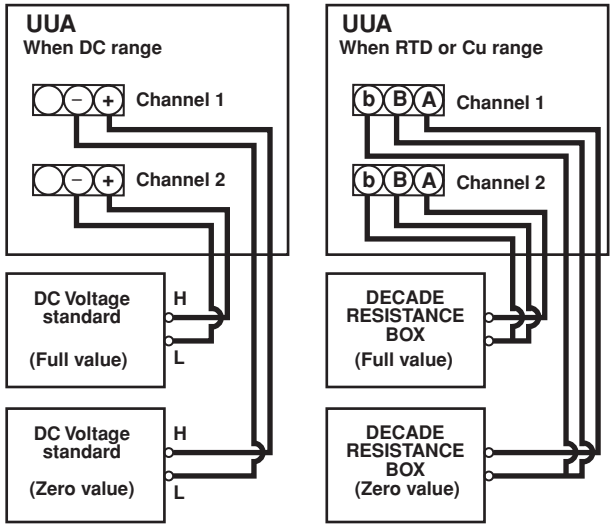
Instrument	Specifications
DC voltage generator	Accuracy: ±0.005% of setting + 1 μV or better
Resistors	10 Ω, 50 Ω, 100 Ω, 150 Ω, 300 Ω, Accuracy: 0.01% or better

● Channel

Enter the Zero value for channel 1 and the Full value for channel 2, and perform the adjustment.

● Procedure

Connection



UUA: Unit Under Adjustment

Input Value

Same as the pen model. See page 4-2.

● **Procedure**

1. Press the MENU and CH UP keys while turning ON the power. **Menu = A/D Adjust** is displayed.
2. With **Menu = A/D Adjust** is displayed, press the ↵ key.

   ```
   Menu=A/D Adjust
   ```

3. Input the password (see page 3-6).

   ```
   Password=
   ```

4. Select **Mode = Cal/Exec**, then press the ↵ key.

   ```
   Mode=Cal/Exec
   ```

5. Select **A/D No. = 1**, then press the ↵ key.

   ```
   A/D No.=1
   ```

6. Select **Range = 20 mV**.

   ```
   Range=20mV
   ```

7. Enter the zero value for the 20 mV range on channel 1 and the Full value on channel 2, then press the ↵ key.
   After measurement, the adjusted value is displayed.

   ```
   Range=20mV
    Z:-585 F:32769
   ```

8. Press the ↵ key.
   You are returned to the A/D No. = screen.

9. Repeat steps 5 to 8 to adjust the following ranges: 60 mV, 200 mV, 1 V, 2 V, 6 V, 20 V, Pt100, Cu10 (with the /N1 option).

Saving Adjusted Values

10. When all adjustments are finished, select **Mode = End**, then press the ↵ key.

    ```
    Mode=End
    ```

11. Select **A/D No. = 1**, then press the ↵ key.

    ```
    A/D No.=1
    ```

12. With **End = Store** displayed, press the ↵ key.
    The adjusted value is saved to the A/D converter.

    ```
    End=Store
    ```

Concluding Adjustments

13. Select **Menu = End**, then press the ↵ key. You are returned to the operation mode.

    ```
    Menu=End
    ```

* Select using the ▽△ key. To enter numerical values, move the cursor to the entry point using the ◁ ▷ key. Select the value using the ▽△ key. You can hold down the **SHIFT** key while pressing ▽△ key or ◁ ▷ key to reverse the key's action.

Adjusting the Ink Ribbon

● **Overview**

This is an adjustment of the position of the ink ribbon. The adjustment is performed when colors of the dots bleed into one another.

● **Procedure**

1. Press the MENU and CH UP keys while turning ON the power. **Menu = A/D Adjust** is displayed.
2. Select **Menu = Aux**, then press the ↵ key.

   ```
   Menu=Aux
   ```

3. Enter the password (see page 3-6), then press the ↵ key.

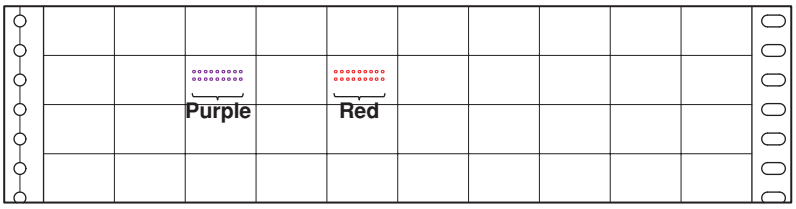
   ```
   Password=
   ```

4. Select **Sub = Rib. shift**, then press the ↵ key.

   ```
   Sub=Rib. shift
   ```

5. Select **Rib. shift = Exec**, then press the ↵ key.
   The ribbon shift adjustment pattern starts printing, and the adjustment value entry screen appears.

   ```
   Rib. shift=Exec
   ```

6. Adjust the numerical value so that the concentration of purple and red is almost the same.

   ```
   R.Adjust=17
   ```

7. After finding the right adjustment value, press the ↵ key.

Saving Adjusted Values

8. When all adjustments are finished, select **Mode = End**, then press the ↵ key.

   ```
   Mode=End
   ```

9. With **End = Store** displayed, press the ↵ key.
   The adjusted value is saved.

   ```
   End=Store
   ```

Concluding Adjustments

10. Select **Menu = End**, then press the ↵ key. You are returned to the operation mode.

    ```
    Menu=End
    ```

* Select using the ▽△ key. To enter numerical values, move the cursor to the entry point using the ◁ ▷ key. Select the value using the ▽△ key. You can hold down the **SHIFT** key while pressing ▽△ key or ◁ ▷ key to reverse the key's action.

Adjusting the Printer Position

● **Overview**

This is an adjustment of the printer position to make the recording position 0 to 180 mm. The adjustment is performed when the recording accuracy is outside the criterion, or when internal components have been replaced.

Conditions

- The adjustment matches the Zero position to the 0% position of the z-fold chart paper.
- It also aligns the Full position from the 0% of the z-fold chart paper to the 180 mm position.
- For measurement, use a Glass scale (or equivalent).

● **Criterion**

Adjustment criterion: ±0.1 mm

● **Procedure**

1. Press the MENU and CH UP keys while turning ON the power. **Menu = A/D Adjust** is displayed.

2. Select **Menu = Pos Adjust**, then press the ↵ key.
   The Hysteresis/Zero/Full selection screen appears.

   ```
   Menu=Pos_Adjust
   ```

Adjusting the Hysteresis

3. Select **P_Adj = Hysteresis**, then press the ↵ key.
   The hysteresis adjustment pattern starts printing, and the adjustment value entry screen appears.

   ```
   P_Adj=Hysteresis
   ```

4. Adjust the numerical value so that the recorded result is as close to a straight line as possible.

   ```
   Hysteresis=-2
   -7/7
   ```

5. When the adjustment is complete, press the ↵ key.
   You are returned to the Hysteresis/Zero/Full selection screen.

Adjusting the Zero Position

6. Select **P_Adj = Zero**, then press the ↵ key.
   The adjustment value input screen in displayed.

   ```
   P_Adj=Zero
   ```

7. Adjust the numerical value so that the pen recorder position overlaps the 0% position of the z-fold chart paper.

   ```
   Zero=7
   0/15
   ```

8. When the adjustment is complete, press the ↵ key.
   You are returned to the Hysteresis/Zero/Full selection screen.

* Select using the ▽△ key. To enter numerical values, move the cursor to the entry point using the ◁ ▷ key. Select the value using the ▽△ key. You can hold down the **SHIFT** key while pressing ▽△ key or ◁ ▷ key to reverse the key's action.

Adjusting the Full Position

9. Select **P_Adj = Full**, then press the ↵ key.
   The adjustment value input screen in displayed.

```
P_Adj=Full
```

10. Adjust the numerical value so that the pen recorder position is in alignment from the 0% position of the z-fold chart paper to the 180 mm position.

```
Full=4
-30/30(B:1000)
```

11. When the adjustment is complete, press the ↵ key.
    You are returned to the Hysteresis/Zero/Full selection screen.

Saving Adjusted Values

12. When all adjustments are finished, select **Mode = End**, then press the ↵ key.

```
Mode=End
```

13. With **End = Store** displayed, press the ↵ key.
    The adjusted value is saved.

```
End=Store
```

Concluding Adjustments

14. Select **Menu = End**, then press the ↵ key. You are returned to the normal operating mode.

```
Menu=End
```


* Select using the ▽△ key. To enter numerical values, move the cursor to the entry point using the ◁ ▷ key. Select the value using the ▽△ key. You can hold down the **SHIFT** key while pressing ▽△ key or ◁ ▷ key to reverse the key's action.

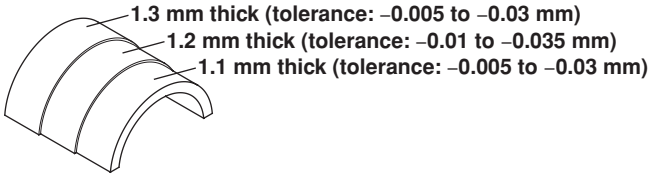
Adjusting the Height of the Carriage

● **Overview**

This is an adjustment of the clearance between the carriage and the platen. The adjustment is performed when the Adjust Shaft Assembly is replaced.

● **Tools Used**

Gauge (B9901JZ: Carriage height adjustment clearance gauge)

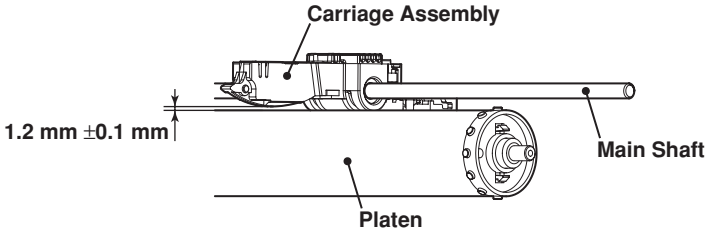


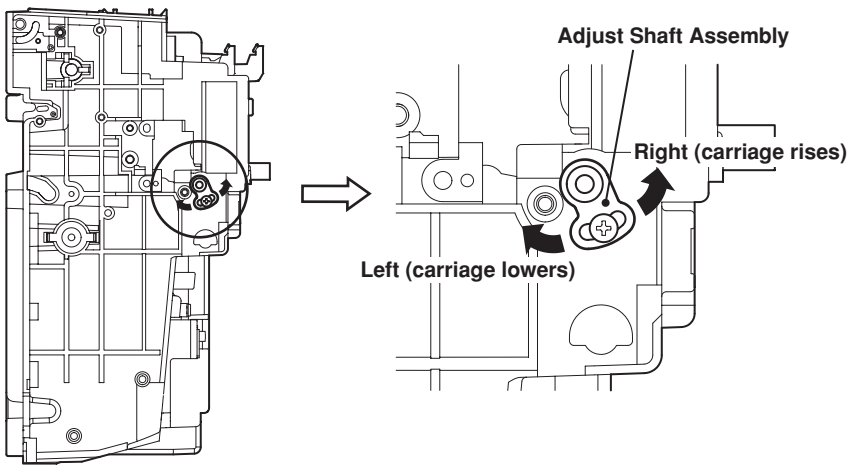
● **Reference Value**

Adjustment reference value: 1.2 mm ±0.1 mm

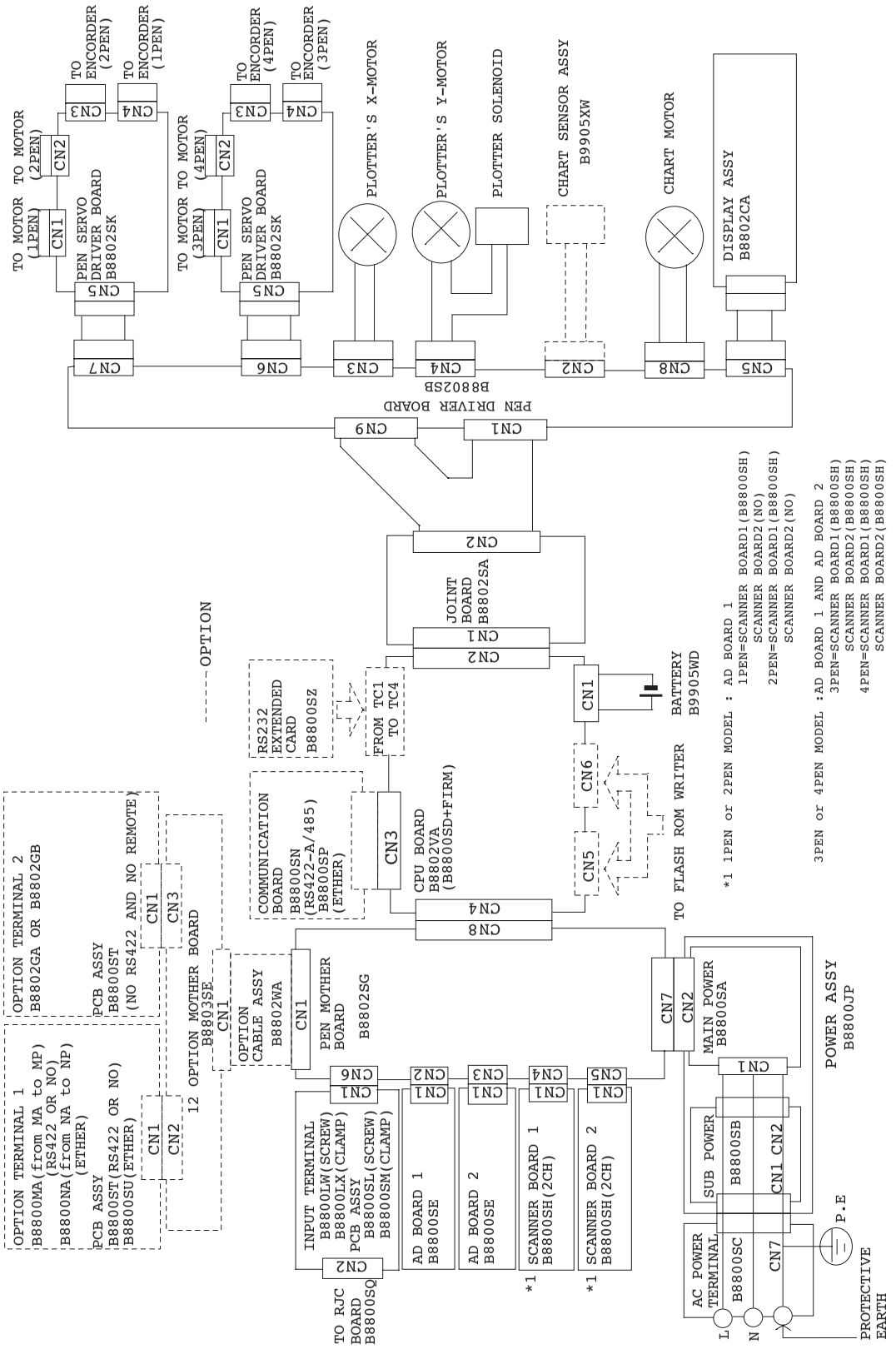
● **Procedure**

1. Pass the Main Shaft and Adjust Shaft Assembly through the hole in the carriage assembly while inserting them into the internal unit.
2. Move the carriage near the center.
3. Remove any chart from the Chart Cassette Assembly and install the assembly.
4. Align the Gauge with the Platen, then adjust the angle of the Adjust Shaft Assembly so that the clearance between the Carriage Assembly and the Platen is within the reference value range, and secure with a screw.
   Screw tightening torque: 0.59 to 0.69 N·m

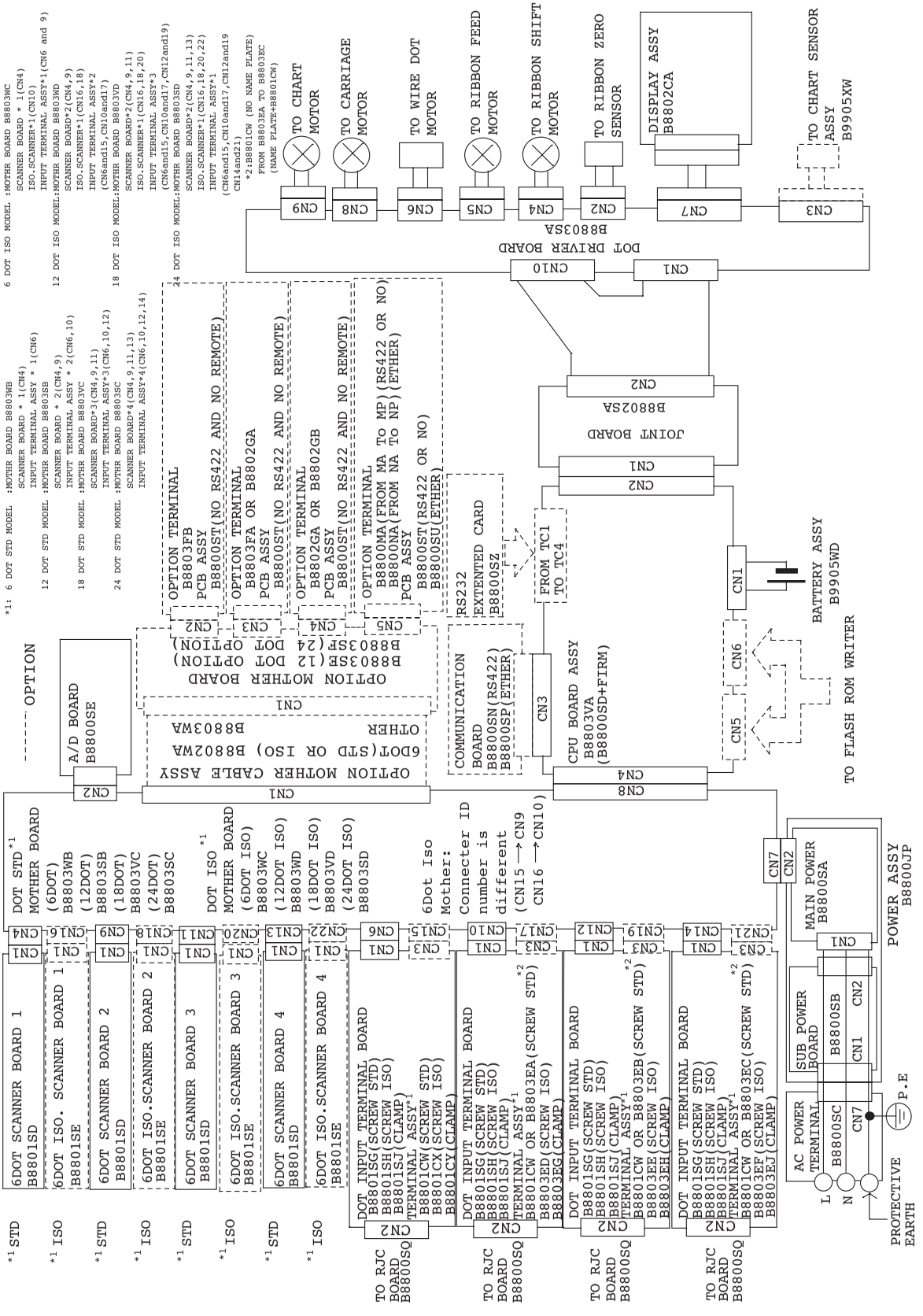




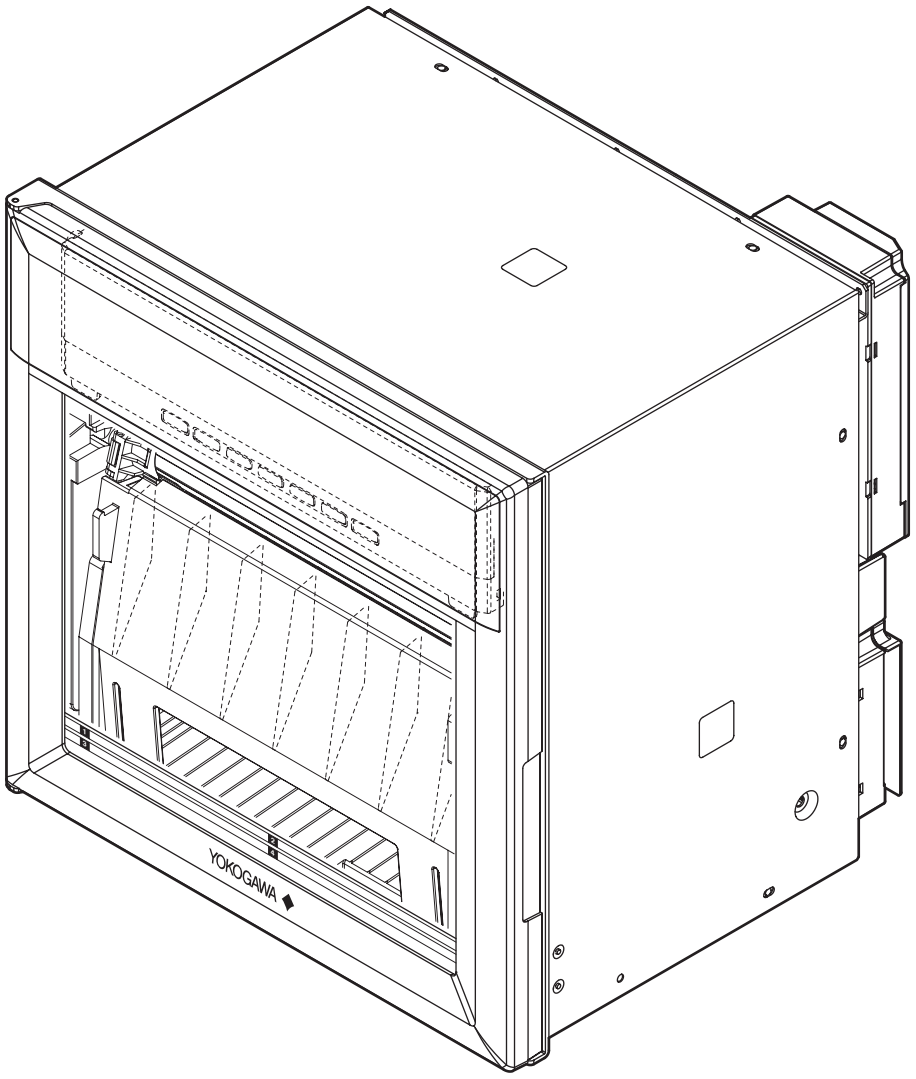
5.1 Schematic Diagram (Pen Model)



5.2 Schematic Diagram (Dot Model)

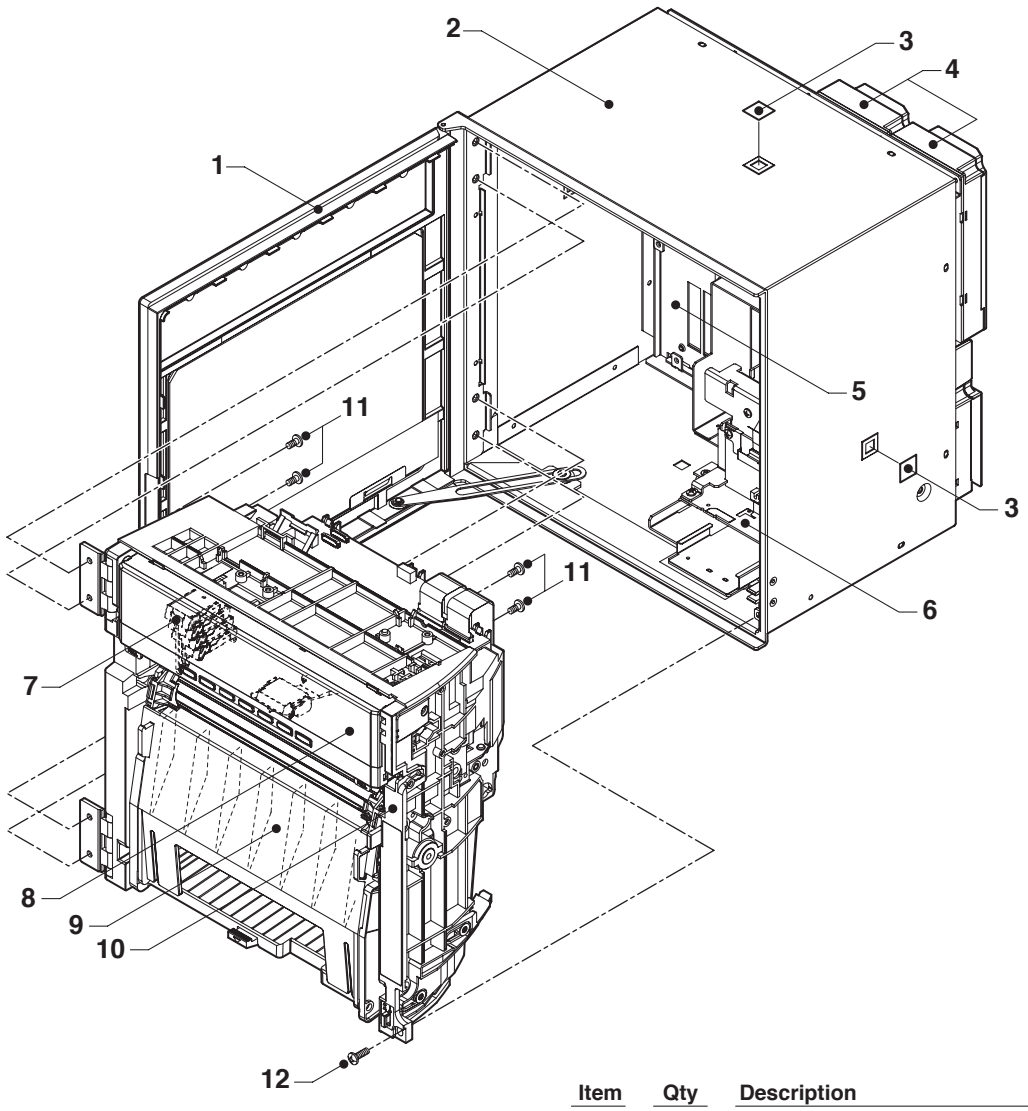

*1: 6 DOT STD MODEL :MOTHR BOARD B8803WB
SCANNER BOARD * 1(CN4)
INPUT TERMINAL ASSY * 1(CN6)
12 DOT STD MODEL :MOTHR BOARD B8803SB
SCANNER BOARD * 2(CN4,9)
INPUT TERMINAL ASSY * 2(CN6,10)
18 DOT STD MODEL :MOTHR BOARD B8803VC
SCANNER BOARD*3(CN4,9,11)
INPUT TERMINAL ASSY*3(CN6,10,12)
24 DOT STD MODEL :MOTHR BOARD B8803SC
SCANNER BOARD*4(CN4,9,11,13)
INPUT TERMINAL ASSY*4(CN6,10,12,14)
6 DOT ISO MODEL :MOTHR BOARD B8803WC
SCANNER BOARD * 1(CN4)
ISO.SCANNER*1(CN10)
INPUT TERMINAL ASSY*1(CN6 and 9)
12 DOT ISO MODEL:MOTHR BOARD B8803WD
SCANNER BOARD*2(CN4,9)
ISO.SCANNER*1(CN16,18)
INPUT TERMINAL ASSY*2
(CN6and15,CN10and17)
18 DOT ISO MODEL:MOTHR BOARD B8803VD
SCANNER BOARD*2(CN4,9,11)
ISO.SCANNER*1(CN16,18,20)
INPUT TERMINAL ASSY*3
(CN6and15,CN10and17,CN12and19)
24 DOT ISO MODEL:MOTHR BOARD B8803SD
SCANNER BOARD*2(CN4,9,11,13)
ISO.SCANNER*1(CN16,18,20,22)
INPUT TERMINAL ASSY*1
(CN6and15,CN10and17,CN12and19
CN14and21)
*2:B8801CW (NO NAME PLATE)
FROM B8803EA TO B8803EC
(NAME PLATE+B8801CW)
TO CHART MOTOR
TO CARRIAGE MOTOR
TO WIRE DOT MOTOR
TO RIBBON FEED MOTOR
TO RIBBON SHIFT MOTOR
TO RIBBON ZERO SENSOR
DISPLAY ASSY B8802CA
TO CHART SENSOR ASSY B9905XW
CN9
CN8
CN6
CN5
CN4
CN2
CN7
CN3
DOT DRIVER BOARD B8803SA
CN10
CN1
JOINT BOARD B8802SA
CN2
CN1
CN2
OPTION TERMINAL B8803FB PCB ASSY B8800ST(NO RS422 AND NO REMOTE)
OPTION TERMINAL B8803FA OR B8802GA PCB ASSY B8800ST(NO RS422 AND NO REMOTE)
OPTION TERMINAL B8802GA OR B8802GB PCB ASSY B8800ST(NO RS422 AND NO REMOTE)
OPTION TERMINAL B8800MA(FROM MA To MP)(RS422 OR NO) B8800NA(FROM NA To NP)(ETHER) PCB ASSY B8800ST(RS422 OR NO) B8800SU(ETHER)
CN2
CN3
CN4
CN5
OPTION MOTHER BOARD B8803SE(12 DOT OPTION) B8803SF(24 DOT OPTION)
CN1
OPTION MOTHER CABLE ASSY 6DOT(STD OR ISO) B8802WA OTHER B8803WA
CN1
CN2
OPTION
A/D BOARD B8800SE
RS232 EXTENTED CARD B8800SZ
COMMUNICATION BOARD B8800SN(RS422) B8800SP(ETHER)
CN3
FROM TC1
TO TC4
CPU BOARD ASSY B8803VA (B8800SD+FIRM)
CN8
CN4
CN1
CN5
CN6
BATTERY ASSY B9905WD
TO FLASH ROM WRITER
CN7
CN2
MAIN POWER B8800SA
CN1
POWER ASSY B8800JP
SUB POWER BOARD
B8800SB
CN1
CN2
B8800SC
CN7
AC POWER TERMINAL
L
N
P.E
PROTECTIVE EARTH
*1 STD
*1 ISO
6DOT SCANNER BOARD 1 B8801SD
6DOT ISO. SCANNER BOARD 1 B8801SE
6DOT SCANNER BOARD 2 B8801SD
6DOT ISO.SCANNER BOARD 2 B8801SE
6DOT SCANNER BOARD 3 B8801SD
6DOT ISO.SCANNER BOARD 3 B8801SE
6DOT SCANNER BOARD 4 B8801SD
6DOT ISO.SCANNER BOARD 4 B8801SE
DOT STD *1 MOTHER BOARD (6DOT) B8803WB
(12DOT) B8803SB
(18DOT) B8803VC
(24DOT) B8803SC
DOT ISO *1 MOTHER BOARD (6DOT ISO) B8803WC
(12DOT ISO) B8803WD
(18DOT ISO) B8803VD
(24DOT ISO) B8803SD
6Dot Iso Mother: Connecter ID number is different (CN15 → CN9 CN16 → CN10)
CN4 CN1 CN16 CN1 CN9 CN1 CN18 CN1 CN11 CN1 CN20 CN1 CN13 CN1 CN22 CN1 CN6 CN1 CN15 CN3 CN10 CN1 CN17 CN3 CN12 CN1 CN19 CN3 CN14 CN1 CN21 CN3
DOT INPUT TERMINAL BOARD B8801SG(SCREW STD) B8801SH(SCREW ISO) B8801SJ(CLAMP) TERMINAL ASSY*1 B8801CW(SCREW STD) B8801CX(SCREW ISO) B8801CY(CLAMP)
DOT INPUT TERMINAL BOARD B8801SG(SCREW STD) B8801SH(SCREW ISO) B8801SJ(CLAMP) TERMINAL ASSY*1 B8801CW OR B8803EA(SCREW STD)*2 B8803ED(SCREW ISO) B8803EG(CLAMP)
DOT INPUT TERMINAL BOARD B8801SG(SCREW STD) B8801SH(SCREW ISO) B8801SJ(CLAMP) TERMINAL ASSY*1 B8801CW OR B8803EB(SCREW STD)*2 B8803EE(SCREW ISO) B8803EH(CLAMP)
DOT INPUT TERMINAL BOARD B8801SG(SCREW STD) B8801SH(SCREW ISO) B8801SJ(CLAMP) TERMINAL ASSY*1 B8801CW OR B8803EC(SCREW STD)*2 B8803EF(SCREW ISO) B8803EJ(CLAMP)
CN2 CN2 CN2 CN2
TO RJC BOARD B8800SQ
TO RJC BOARD B8800SQ
TO RJC BOARD B8800SQ
TO RJC BOARD B8800SQ

6.1 Customer Maintenance Parts List (Pen Model)



Note:
Parts marked with a ◎symbol are Customer Maintenance Parts (CMP).

Complete Set

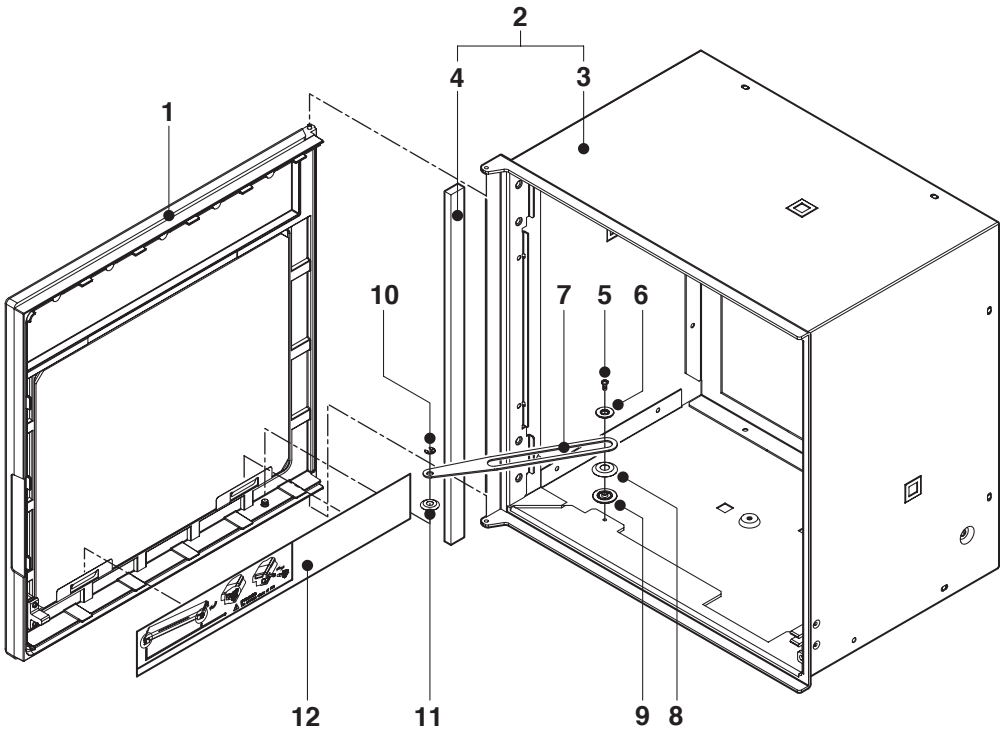


Item	Qty	Description
1	1	Door Assembly
2	1	Case Assembly
3	4	Name Plate (B9900CR) (not /H5[ ])
4	-	Terminal Assembly
5	1	Panel Assembly
6	1	CPU Board Assembly
7	1	Pen Servo Assembly
8	1	Display Assembly
9	1	Chart Cassette Assembly
10	1	Frame Assembly (see page 6-4)
11	4	Screw (Y9405LB)
12	1	Screw (Y9410LE)

Note:

◎ (CMP)

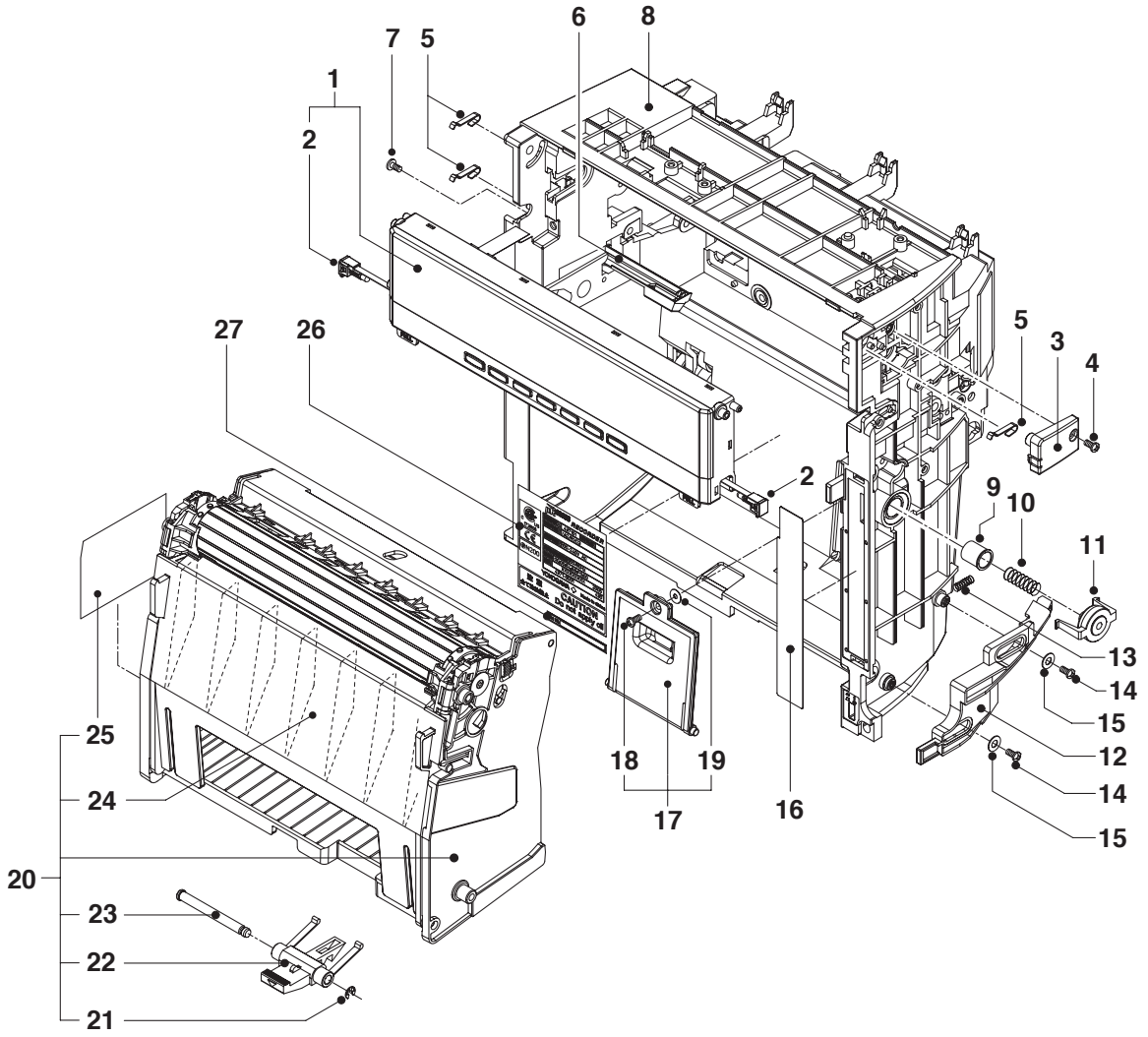
Case and Door Assembly



	Item	Part No.	Qty Model	437101	437102	437103	437104	Description	
	1	B8802BA		1	1	1	1	Door Assembly	(select)
		B8802BB		1	1	1	1	Door Assembly (/H3)	
	2	B8802BK		1	1	1	1	Case Assembly	
	3	B8802BL		1	1	1	1	Case Assembly	
	4	B8802BQ		1	1	1	1	Case Gasket	
	5	B8802BZ		1	1	1	1	Screw	
	6	B9905CL		1	1	1	1	Boss	
	7	B9905DL		1	1	1	1	Stay	
	8	E9660JF		1	1	1	1	Spring	
	9	B9905CP		1	1	1	1	Boss	
	10	Y9300ET		1	1	1	1	Retainer	
	11	E9655KH		1	1	1	1	Spring	
◎	12	B8802AE		1				1Pen TAG Assembly	(select)
		B8802AF			1			2Pen TAG Assembly	
		B8802AG				1		3Pen TAG Assembly	
		B8802AH					1	4Pen TAG Assembly	

Note:
◎ (CMP)

Chart Cassette and Display Assembly



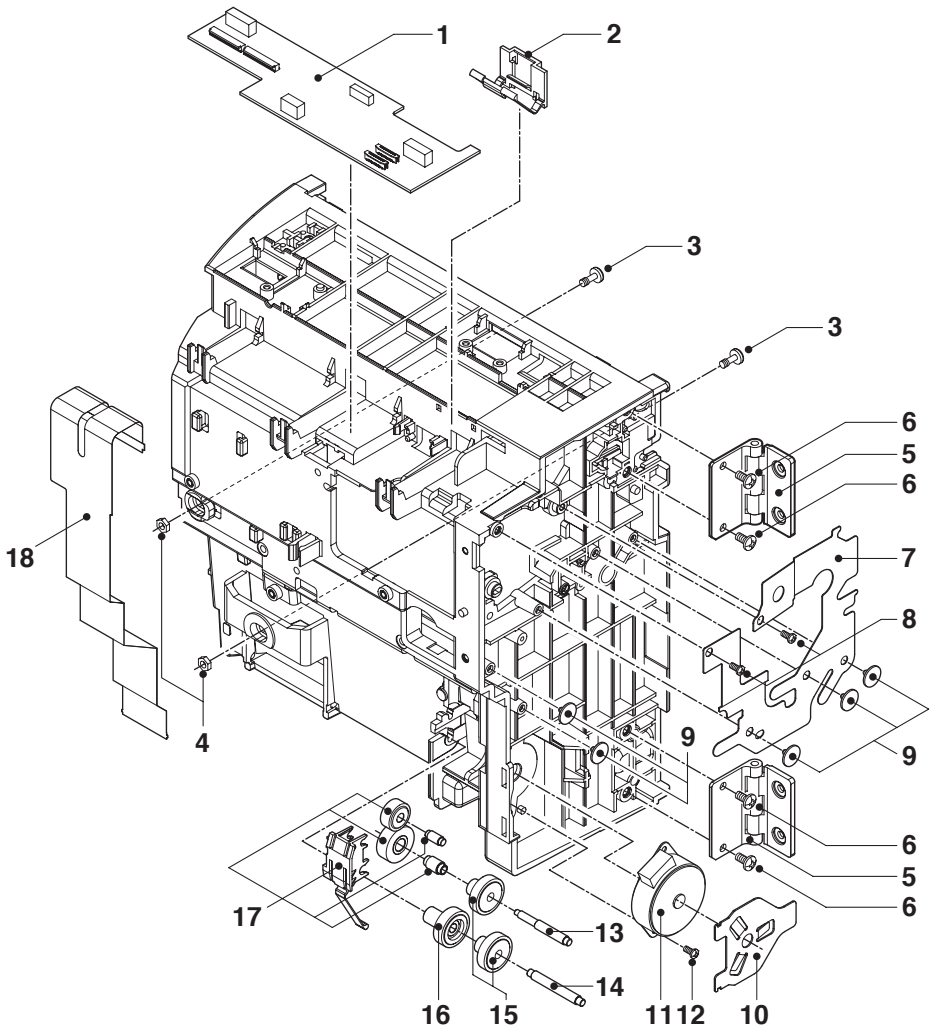
	Item	Part No.	Qty	Description
◎	1	B8802CA	1	Display Assembly
◎	2	B8800CR	2	LED Assembly
	3	B8802DF	1	VFD Holder
	4	Y9308LB	1	Screw
	5	B8802DG	3	VFD Spring
	6	B9905XW	1	Chart Sensor Assembly (/F1) (select)
	7	B9988DL	1	PT Screw (/F1) (select)
	8	B8802DB	1	Main Frame
	9	B9905GZ	1	Sleeve
	10	B9905HA	1	Spring
	11	B9905HC	1	Latch
	12	B8802DE	1	Switch Lever
	13	B9962EN	1	Spring
	14	B9988DL	2	Screw
	15	Y9401WB	2	Washer
	16	B8802DJ	1	Sheet
	17	B9905HG	1	Cover Assembly
	18	Y9308LB	1	Screw (M3x8)
	19	B9905SH	1	Push Nut

	Item	Part No.	Qty	Description
◎	20	B9905EA	1	Chart Cassette Assembly
	21	Y9400ET	1	Retainer E
	22	B9905EK	1	Latch
	23	B9905AZ	1	Shaft
◎	24	B9905FS	1	Front Cover
	25	B9905FT	1	Name Plate
	26	-	1	Name Plate
	27	-	-	Name Plate

Note:

◎ (CMP)

Frame and Chart Motor Assembly

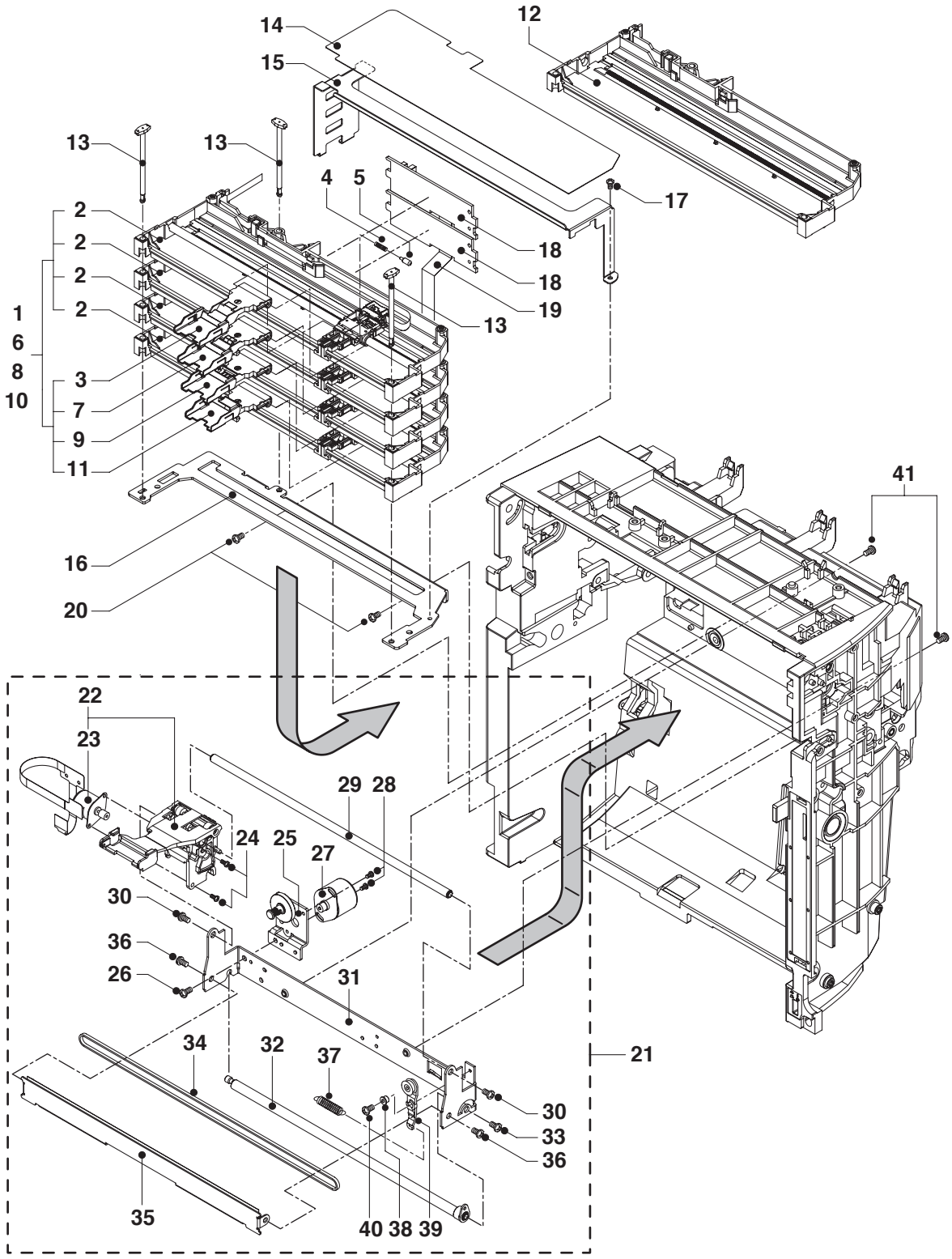


Item	Part No.	Qty	Description
1	B8802SB	1	Pen Driver PCB
2	B9905PZ	1	FPC Clamp
3	B9905HT	2	Screw
4	Y9401CB	2	Nut
5	B9905HK	2	Hinge Assembly
6	Y9405LB	4	Screw
7	B9905HQ	1	Plate
8	Y9305LB	2	Screw
9	B9905HS	5	Pin
10	B9905GW	1	Bracket
11	B9905GS	1	Motor Assembly
12	B9988DL	1	Tapping Screw
13	B9905GQ	1	Shaft
14	B9905GP	1	Shaft
15	B9905GM	2	Gear
16	B9905GN	1	Gear
17	B9905GF	1	Chart Feed Gear Assembly
18	B8802DR	1	CPU DR Joint FPC

Note:

◎ (CMP)

Pen Servo and Plotter Assembly (1/2)



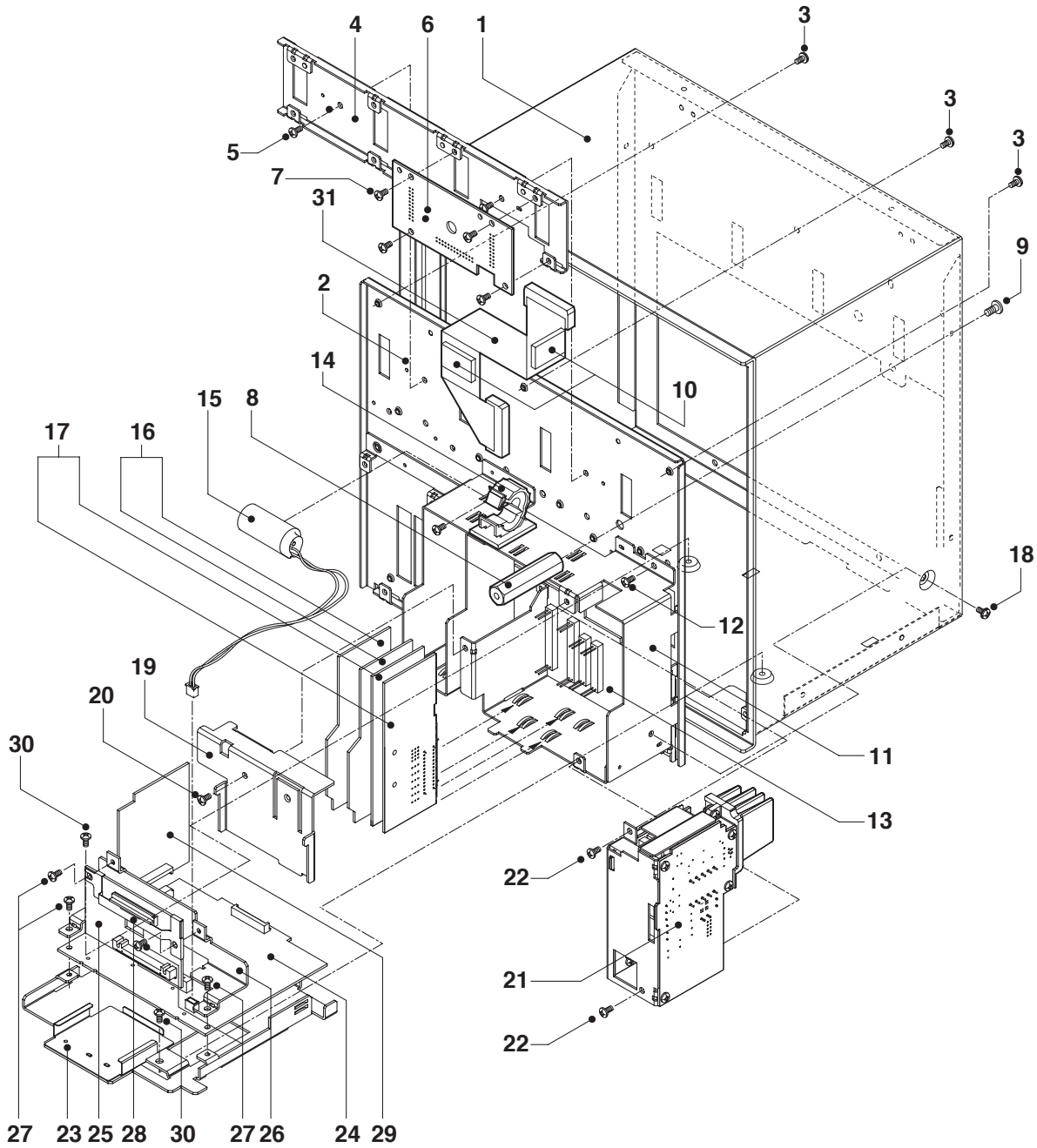
Pen Servo and Plotter Assembly (2/2)

Item	Part No.	Qty Model 437101	437102	437103	437104	Description
1	B8802EA	1	1	1	1	1Pen Servo Assembly
2	B8802EF	1	2	3	4	Pen Servo Assembly
3	B8800HA	1	1	1	1	1Pen Arm Assembly
4	B9900LQ	1	2	3	4	Spring
5	B8800FY	1	2	3	4	Pen Arm Shaft
6	B8802EB		1	1	1	2Pen Servo Assembly
7	B8800HB		1	1	1	2Pen Arm Assembly
8	B8802EC			1	1	3Pen Servo Assembly
9	B8800HC			1	1	3Pen Arm Assembly
10	B8802ED				1	4Pen Servo Assembly
11	B8800HD				1	4Pen Arm Assembly
12	B8802EH	3	2	1	-	Pen Servo 18 Spacer
13	B8802DP	3	3	3	3	Base Latch 3
14	B8802DT	1	1	1	1	Dust Cover
15	B8802DN	1	1	1	1	Servo Top Cover
16	B8802DM	1	1	1	1	Pen base Bracket
17	Y9904KB	1	1	1	1	Screw M2.5
18	B8802SK	1	1	2	2	Pen Servo PCB
19	B8802DS	1	1	2	2	Servo Joint FPC18
20	Y9306LB	2	2	2	2	Screw M3x6
21	B9905NA	1	1	1	1	Plotter Assembly
22	B9905NB	1	1	1	1	Carriage Assembly
23	B9905NX	1	1	1	1	Motor Assembly
24	Y9204LS	2	2	2	2	Screw M2x4
	Y9201WB	4	4	4	4	Washer
25	B9900RB	1	1	1	1	Bracket Assembly
26	Y9304LB	1	1	1	1	Screw M3x4
27	B9905NS	1	1	1	1	Motor Assembly
28	Y9204LS	2	2	2	2	Screw M2x4
29	B9905NE	1	1	1	1	Shaft
30	Y9304LB	2	2	2	2	Screw M3x4
31	B9905ND	1	1	1	1	Frame
32	B9905NF	1	1	1	1	Shaft Assembly
33	Y9304LB	1	1	1	1	Screw M3x4
34	B9905NL	1	1	1	1	Belt
35	B9905NP	1	1	1	1	Bracket Assembly
36	Y9304LB	2	2	2	2	Screw M3x4
37	B9900RM	1	1	1	1	Spring 2044
38	B9900RK	1	1	1	1	Collar
39	B9900RH	1	1	1	1	Lever Assembly
40	Y9206LS	1	1	1	1	Screw M2x6
41	Y9306LB	2	2	2	2	Screw M3x6

Note:

◎ (CMP)

CPU and Rear Panel Assembly (1/2)



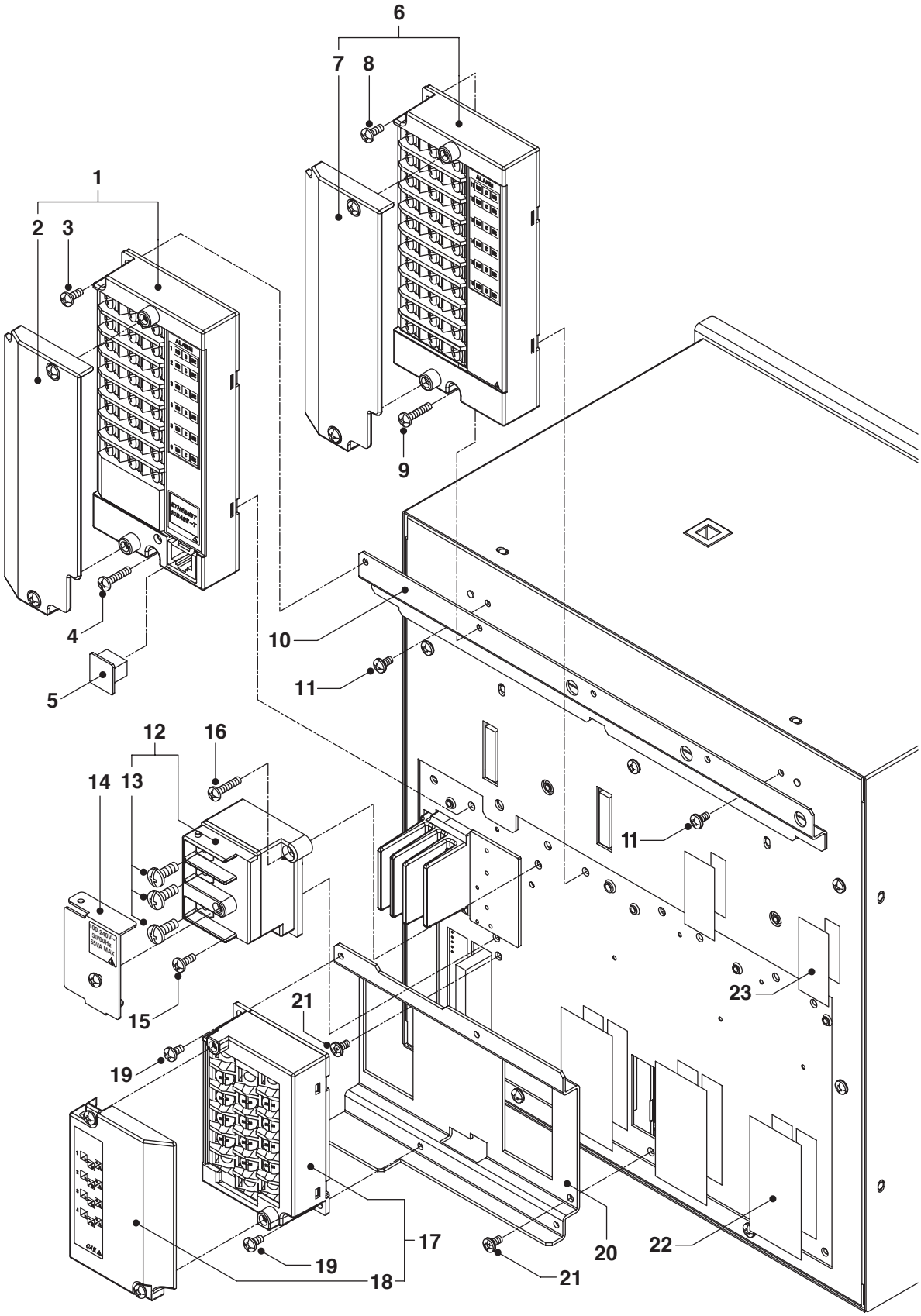
CPU and Rear Panel Assembly (2/2)

Item	Part No.	Qty Model	437101	437102	437103	437104	Description
1	B8802BK		1	1	1	1	Case Assembly
2	B8802FA		1	1	1	1	Rear Panel Assembly (not /P1) } (select)
	B8802FB		1	1	1	1	Rear Panel Assembly (/P1) } (select)
3	Y9305LK		6	6	6	6	Screw (M3x5)
4	B8802FL		1	1	1	1	Option Bracket (select) *1
5	Y9305LB		2	2	2	2	Screw (M3x5)
6	B8803SE		1	1	1	1	12 Option Mother PCB (select) *1
7	Y9305LB		4	4	4	4	Screw (M3x5)
8	B9905RX		1	1	1	1	Rod
9	Y9405LB		1	1	1	1	Screw (M4x5)
10	A9099KY		2	2	2	2	Clamp (select) *1
11	B8802FG		1	1	1	1	Bracket Assembly
12	Y9305LB		5	5	5	5	Screw (M3x5)
13	B8802SG		1	1	1	1	Pen 20000 Mother PCB
14	B9905RW		1	1	1	1	Clamp
15	B9905WD		1	1	1	1	Battery Assembly
16	B8800SE		1	1	2	2	AD Board PCB (select)
17	B8800SH		1	1	2	2	2ch Scanner PCB (select)
18	Y9305LK		1	1	1	1	Screw (M3x5)
19	B8802FM		1	1	1	1	Board Bracket
20	Y9305LB		1	1	1	1	Screw (M3x5)
21	B8800JP		1	1	1	1	Power Assembly (not /P1) } (select)
	B8800JQ		1	1	1	1	Power Assembly (/P1) } (select)
	-		1	1	1	1	Terminal Assembly (see page 6-11)
22	Y9305LB		2	2	2	2	Screw (M3x5)
23	B8802BU		1	1	1	1	CPU Bracket Assembly
24	B8802VA		1	1	1	1	PEN20 CPU Assembly
25	B8802SA		1	1	1	1	Joint Board PCB
26	B8802BX		1	1	1	1	Connector Bracket
27	Y9305LB		4	4	4	4	Screw (M3x5)
28	B8802BY		1	1	1	1	Guide Bracket
29	B8800SN		1	1	1	1	R422 COM PCB (/C3) } (select)
	B8800SP		1	1	1	1	Ether COM PCB (/C7) } (select)
30	Y9305LB		2	2	2	2	Screw (M3x5)
31	B8802WA		1	1	1	1	Cable Assembly (select) *1

Note: *1 Option or /A1/A2/A3/A4/F1/R1

Note:
◎ (CMP)

Terminal Assembly (1/3)



Terminal Assembly (2/3)

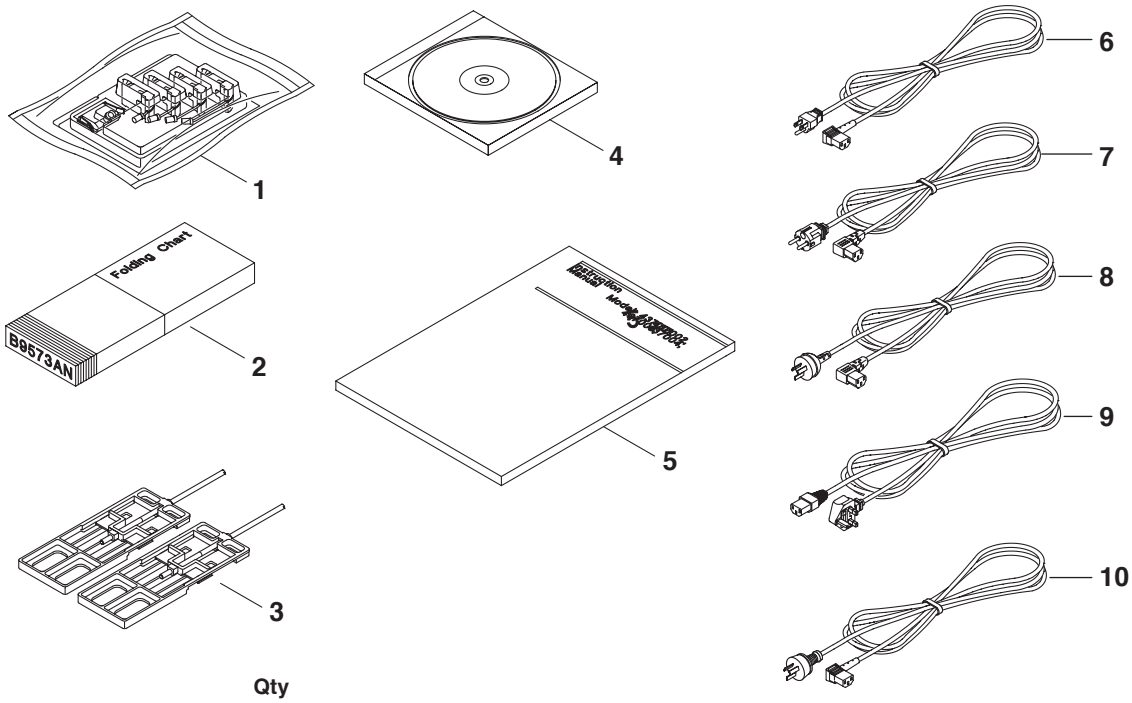
Item	Part No.	Qty	Description	
1	B8800MA	1	Option Terminal Assembly *1,*31	(select) (see page 6-12)
	B8800MB	1	Option Terminal Assembly *2,*32	
	B8800MC	1	Option Terminal Assembly *3,*33,*44,*45	
	B8800MD	1	Option Terminal Assembly *4	
	B8800ME	1	Option Terminal Assembly *5,*34	
	B8800MF	1	Option Terminal Assembly *6,*35	
	B8800MG	1	Option Terminal Assembly *7,*36	
	B8800MH	1	Option Terminal Assembly *8,*37	
	B8800MJ	1	Option Terminal Assembly *9,*38	
	B8800MK	1	Option Terminal Assembly *10,*39,*46,*47	
	B8800ML	1	Option Terminal Assembly *11,*40	
	B8800MM	1	Option Terminal Assembly *12,*41	
	B8800MN	1	Option Terminal Assembly *13,*42	
	B8800MP	1	Option Terminal Assembly *14,*43	
	B8800NA	1	Option Terminal Assembly *15	
	B8800NB	1	Option Terminal Assembly *16	
	B8800NC	1	Option Terminal Assembly *17,*52	
	B8800ND	1	Option Terminal Assembly *18	
	B8800NE	1	Option Terminal Assembly *19	
	B8800NF	1	Option Terminal Assembly *20	
	B8800NG	1	Option Terminal Assembly *21	
	B8800NH	1	Option Terminal Assembly *22	
	B8800NJ	1	Option Terminal Assembly *23	
	B8800NK	1	Option Terminal Assembly *24,*50	
	B8800NL	1	Option Terminal Assembly *25	
	B8800NM	1	Option Terminal Assembly *26	
	B8800NN	1	Option Terminal Assembly *27	
	B8800NP	1	Option Terminal Assembly *28	
◎ 2	B8800KG	1	Option Cover Assembly	
3	Y9308LB	1	Screw (M3x8)	
4	Y9318LB	1	Screw (M3x18)	
◎ 5	A1447JZ	1	Access of Conn	
6	B8802GA	1	Option Terminal Assembly *29	(select) (see page 6-12)
	B8802GB	1	Option Terminal Assembly *30,*48,*49,*51,*53	
◎ 7	B8800KG	1	Option Cover Assembly	
8	Y9308LB	1	Screw (M3x8)	
9	Y9318LB	1	Screw (M3x18)	
10	B9905BN	1	Bracket	
11	Y9305LK	2	Screw (M3x5)	
12	B8800JJ	1	Terminal Assembly (not /P1)	(select)
	B8800JK	1	Terminal Assembly (/P1)	
◎ 13	E9655FX	3	Screw	
◎ 14	B8802AJ	1	Cover Assembly (not /P1, /H5[ ])	(select)
	B8802AK	1	Cover Assembly (/P1) (not /H5[ ])	
15	Y9305LB	1	Screw (M3x5)	
16	Y9310LB	1	Screw (M3x10) (not /H5[ ])	(select)
	Y9314LB	1	Screw (M3x14) (/H5[ ])	
17	B8800LY	1	Input Terminal Assembly (not /H2)	(select)
	B8800LX	1	Input Terminal Assembly (/H2)	
◎ 18	B8800AM	1	Input Cover Assembly (not /H2)	(select)
	B8800AN	1	Input Cover Assembly (/H2)	
19	Y9306LB	2	Screw (M3x6)	
20	B9905CR	1	Bracket	
21	Y9305LK	2	Screw (M3x5)	
22	B8802BJ	3	Sheet	
23	B9900BT	1-4	Name Plate (select)	

Note:
◎ (CMP)

Terminal Assembly (3/3)

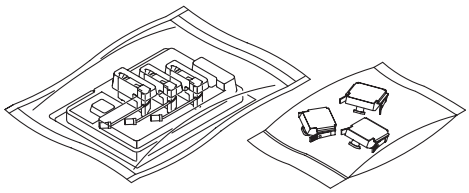
Option Terminal	Suffix Code (Options)						
B8800MA	/A1			/C3			*1
B8800MB	/A2			/C3			*2
B8800MC	/A3			/C3			*3
B8800MD				/C3			*4
B8800ME		/F1		/C3			*5
B8800MF	/A1	/F1		/C3			*6
B8800MG	/A2	/F1		/C3			*7
B8800MH	/A1		/R1	/C3			*8
B8800MJ	/A2		/R1	/C3			*9
B8800MK	/A3		/R1	/C3			*10
B8800ML			/R1	/C3			*11
B8800MM		/F1	/R1	/C3			*12
B8800MN	/A1	/F1	/R1	/C3			*13
B8800MP	/A2	/F1	/R1	/C3			*14
B8800NA	/A1				/C7		*15
B8800NB	/A2				/C7		*16
B8800NC	/A3				/C7		*17
B8800ND					/C7		*18
B8800NE		/F1			/C7		*19
B8800NF	/A1	/F1			/C7		*20
B8800NG	/A2	/F1			/C7		*21
B8800NH	/A1		/R1		/C7		*22
B8800NJ	/A2		/R1		/C7		*23
B8800NK	/A3		/R1		/C7		*24
B8800NL			/R1		/C7		*25
B8800NM		/F1	/R1		/C7		*26
B8800NN	/A1	/F1	/R1		/C7		*27
B8800NP	/A2	/F1	/R1		/C7		*28
B8802GA	/A3	/F1					*29
B8802GB	/A4						*30
B8800MA	/A1						*31
B8800MB	/A2						*32
B8800MC	/A3						*33
B8800ME		/F1					*34
B8800MF	/A1	/F1					*35
B8800MG	/A2	/F1					*36
B8800MH	/A1		/R1				*37
B8800MJ	/A2		/R1				*38
B8800MK	/A3		/R1				*39
B8800ML			/R1				*40
B8800MM		/F1	/R1				*41
B8800MN	/A1	/F1	/R1				*42
B8800MP	/A2	/F1	/R1				*43
B8800MC	/A4						*44
B8800MC	/A4			/C3			*45
B8800MK	/A4		/R1				*46
B8800MK	/A4		/R1	/C3			*47
B8802GB	/A4		/R1				*48
B8802GB	/A4		/R1	/C3			*49
B8800NK	/A4		/R1		/C7		*50
B8802GB	/A4		/R1		/C7		*51
B8800NC	/A4				/C7		*52
B8802GB	/A4				/C7		*53

Standard Accessories



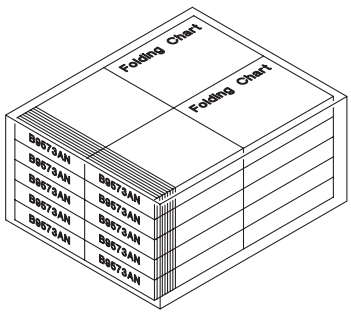
Item	Part No.	Model	Qty 437101	437102	437103	437104	Description	
1	—		1				Pen Assembly (1st pen and plotter pen)	*1
	—			1			Pen Assembly (1st, 2nd pen and plotter pen)	
	—				1		Pen Assembly (1st, 2nd, 3rd pen and plotter pen)	
	—					1	Pen Assembly (1st, 2nd, 3rd, 4th pen and plotter pen)	
2	B9573AN		1	1	1	1	Chart *2	
3	B9900BX		2	2	2	2	Bracket Assembly (not /H5[ ])	
4	B8800LZ		1	1	1	1	CD-ROM for Manuals	
5	—		1	1	1	1	Manuals	
6	A1006WD		1	1	1	1	Power Cord Set (/H5D) (UL,CSA standard)	(select)
7	A1009WD		1	1	1	1	Power Cord Set (/H5F) (VDE standard)	
8	A1064WD		1	1	1	1	Power Cord Set (/H5H) (GB standard)	
9	A1023WD		1	1	1	1	Power Cord Set (/H5J) (BS standard)	
10	A1024WD		1	1	1	1	Power Cord Set (/H5R) (AS standard)	

Spares



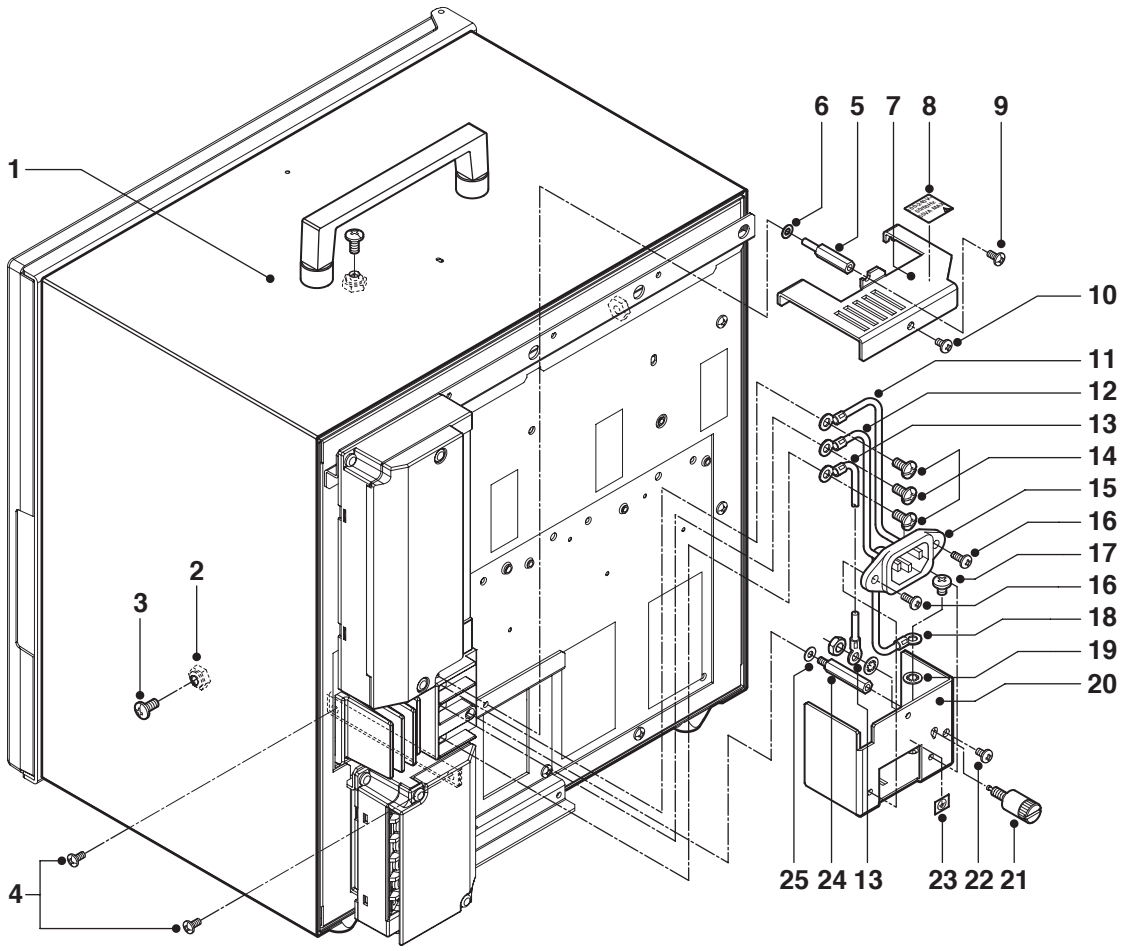
Note *1 Pen package is supplied in packs of 3pcs
One pack is the minimum order quantity.

Part No.	Description
B9902AM	1st Pen (red)
B9902AN	2nd Pen (green)
B9902AP	3rd Pen (blue)
B9902AQ	4th Pen (violet)
B9902AR	Plotter Pen (purple)



*2 Part number: B9573AN
Minimum order quantity: 10 units
(1 chart/unit)

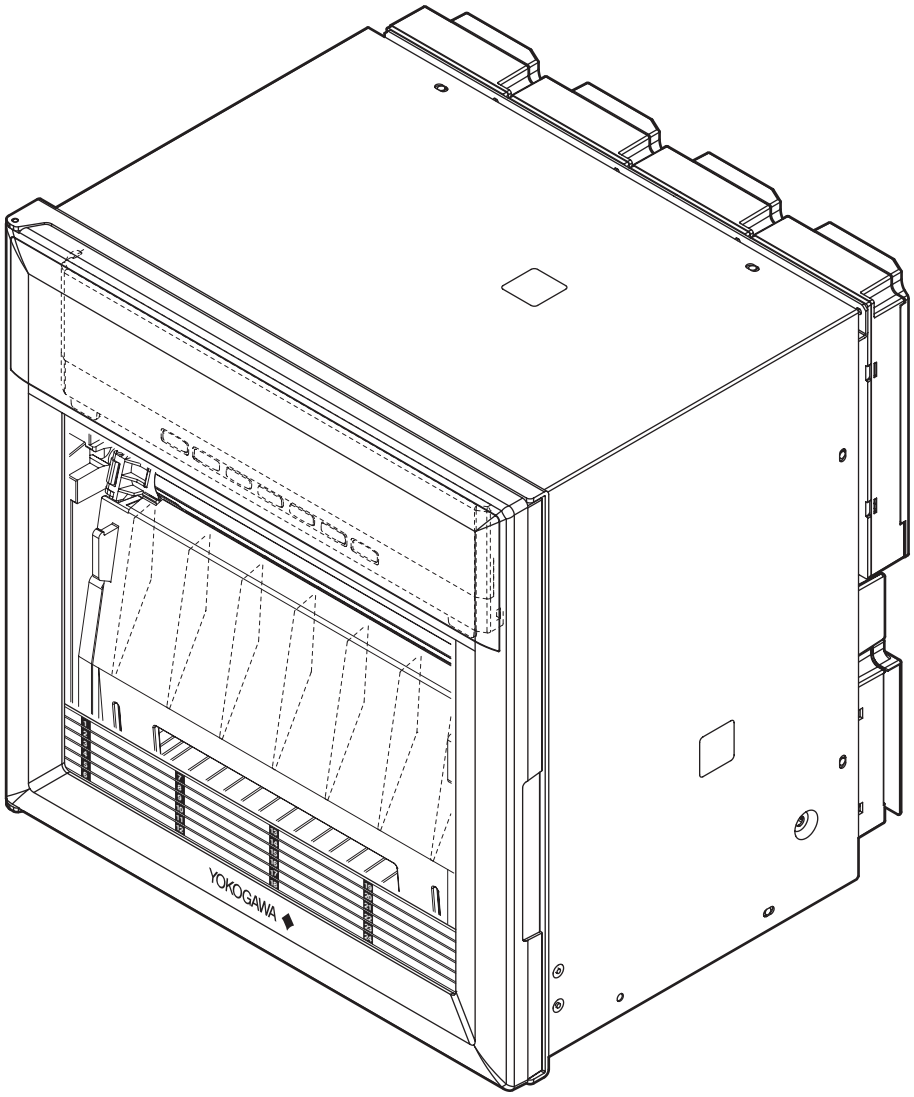
Portable Type (/H5[ ])



Item	Part No.	Qty	Description
1	B8802GE	1	Cover Assembly
2	B9905KX	3	Collar
3	Y9406LB	3	Screw (M4x6)
4	Y9304LB	2	Screw (M3x4)
5	B9905KV	1	Rod (/A1, /A2, /A3, /A4, /C3, /C7, /F1, /R1) } (select)
	B9905KY	1	Stud (not /A1, /A2, /A3, /A4, /C3, /C7, /F1, /R1) }
6	Y9725YA	1	Spacer (not /A1, /A2, /A3, /A4, /C3, /C7, /F1, /R1)
7	B8802GG	1	Cover
8	B8802AD	1	Name Plate
9	Y9304LB	1	Screw (M3x4)
10	Y9304LK	1	Screw (M3x4)
11	B9902LK	1	Wire Assembly (Black)
12	B9902LJ	1	Wire Assembly (White)
13	B9902LL	1	Wire Assembly (Green)
14	E9655FX	(3)	Screw
15	A1017JS	1	Socket
16	Y9306LB	2	Screw (M3x6)
17	Y9405LB	1	Screw (M4x5)
18	B9902LN	1	Wire Assembly (Green)
19	Y9401WL	1	Washer
20	B8800LH	1	Bracket
21	A9019ZH	1	Terminal Assembly
22	Y9304LB	1	Screw (M3x4)
23	B9529AU	1	Name Plate
24	B9902LM	1	Rod
24	Y9301WB	1	Washer

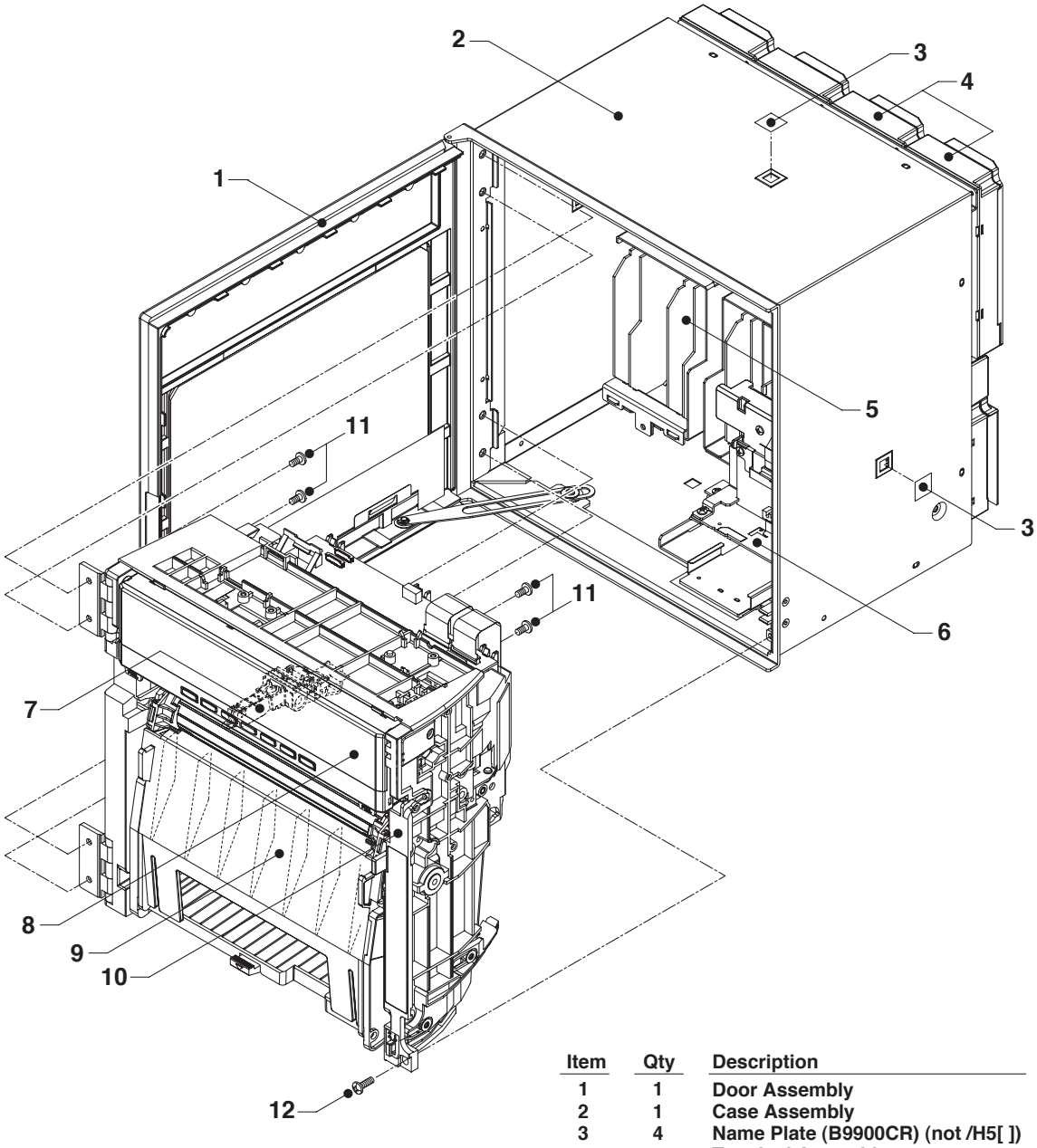
Note:
◎ (CMP)

6.2 Customer Maintenance Parts List (Dot Model)



Note:
Parts marked with a ◎symbol are Customer Maintenance Parts (CMP).

Complete Set

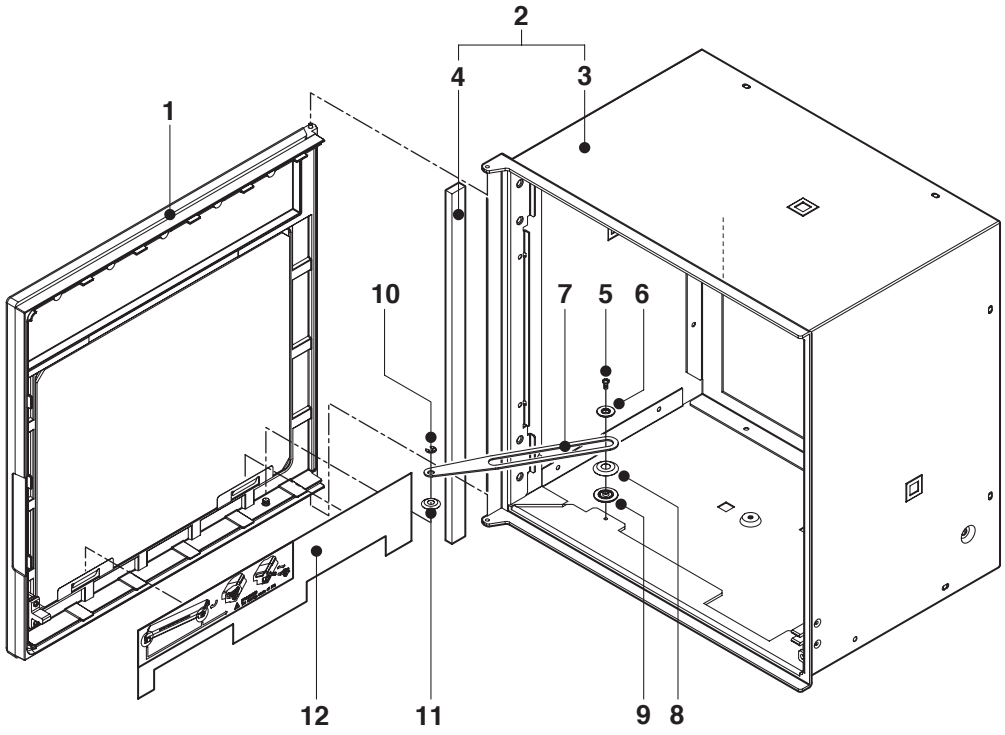


Item	Qty	Description
1	1	Door Assembly
2	1	Case Assembly
3	4	Name Plate (B9900CR) (not /H5[ ])
4	-	Terminal Assembly
5	1	Panel Assembly
6	1	CPU Board Assembly
7	1	Dot Printer Assembly
8	1	Display Assembly
9	1	Chart Cassette Assembly
10	1	Frame Assembly (see page 6-18)
11	4	Screw (Y9405LB)
12	1	Screw (Y9410LE)

Note:

◎ (CMP)

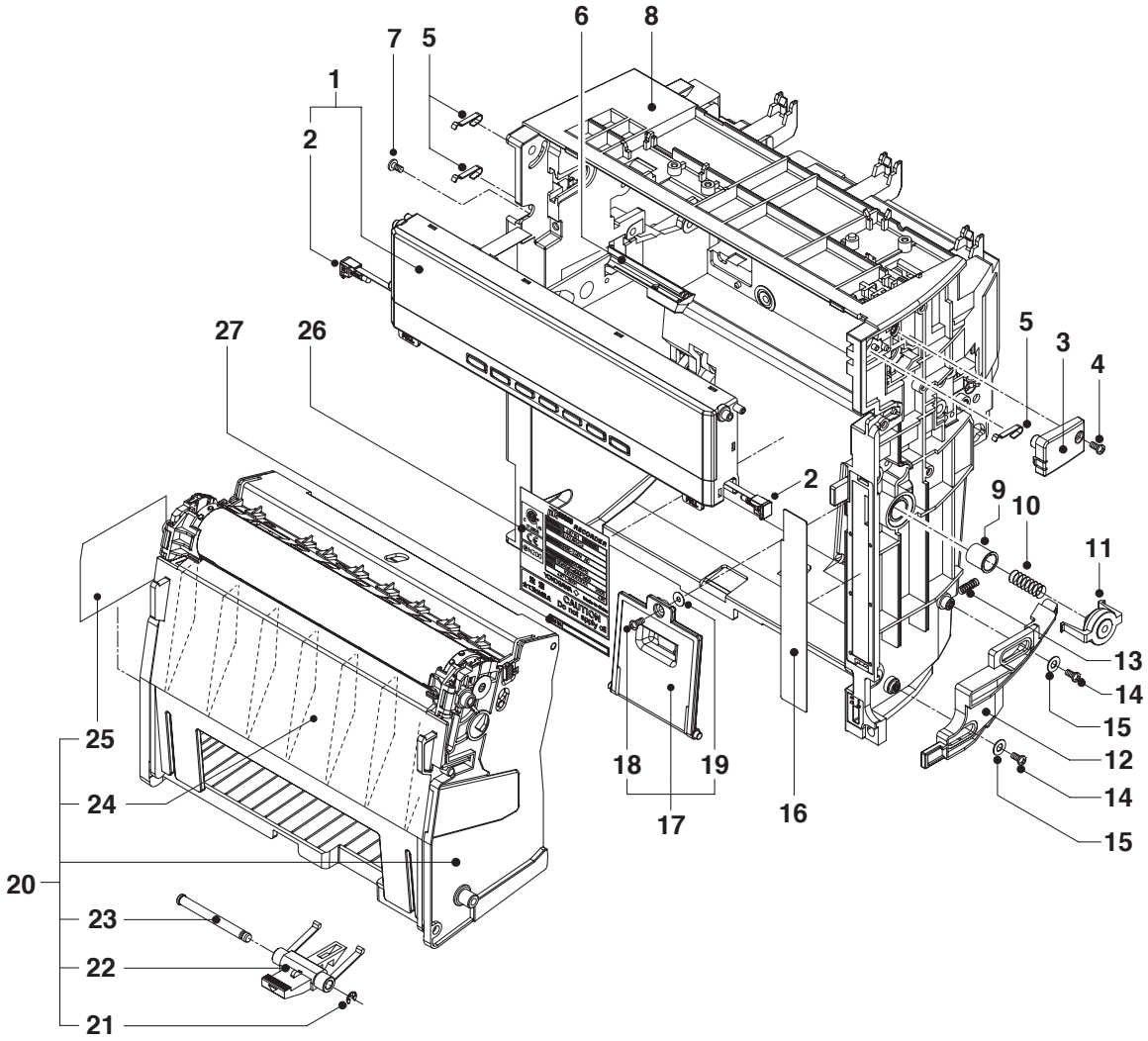
Case and Door Assembly



Item	Part No.	Qty Model 437106	437112	437118	437124	Description	
1	B8802BA	1	1	1	1	Door Assembly	(select)
	B8802BB	1	1	1	1	Door Assembly (/H3)	
2	B8802BK	1	1	1	1	Case Assembly	
3	B8802BL	1	1	1	1	Case Assembly	
4	B8802BQ	1	1	1	1	Case Gasket	
5	B8802BZ	1	1	1	1	Screw	
6	B9905CL	1	1	1	1	Boss	
7	B9905DL	1	1	1	1	Stay	
8	E9660JF	1	1	1	1	Spring	
9	B9905CP	1	1	1	1	Boss	
10	Y9300ET	1	1	1	1	Retainer	
11	E9655KH	1	1	1	1	Spring	
◎ 12	B8803AE	1				6 Dot TAG Assembly	
	B8803AF		1			12 Dot TAG Assembly	
	B8803AG			1		18 Dot TAG Assembly	(select)
	B8803AH				1	24 Dot TAG Assembly	

Note:
◎ (CMP)

Chart Cassette and Display Assembly



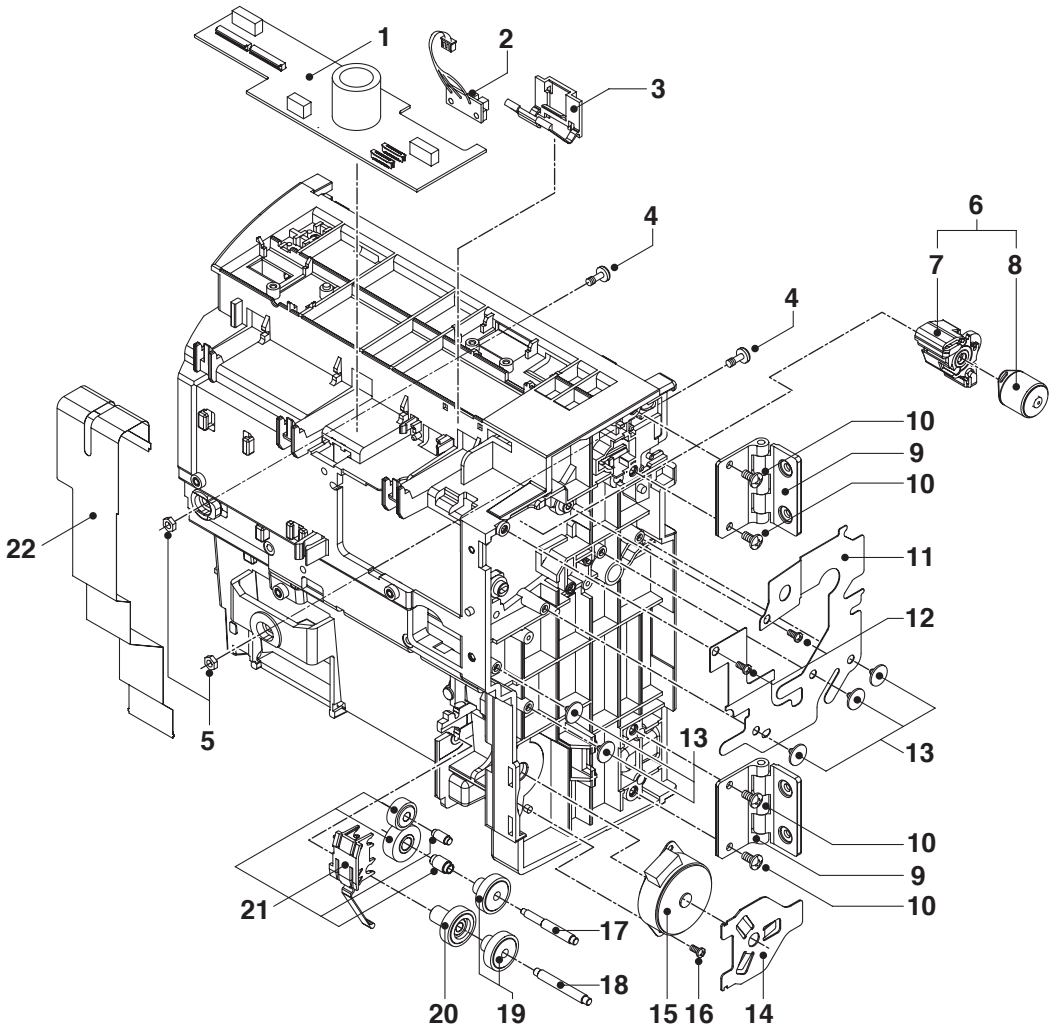
	Item	Part No.	Qty	Description
	1	B8802CA	1	Display Assembly
◎	2	B8800CR	2	LED Assembly
	3	B8802DF	1	VFD Holder
	4	Y9308LB	1	Screw
	5	B8802DG	3	VFD Spring
	6	B9905XW	1	Chart Sensor Assembly (/F1) (select)
	7	B9988DL	1	PT Screw (/F1) (select)
	8	B8802DB	1	Main Frame
	9	B9905GZ	1	Sleeve
	10	B9905HA	1	Spring
	11	B9905HC	1	Latch
	12	B8802DE	1	Switch Lever
	13	B9962EN	1	Spring
	14	B9988DL	2	Screw
	15	Y9401WB	2	Washer
	16	B8802DJ	1	Sheet
	17	B9905HG	1	Cover Assembly
	18	Y9308LB	1	Screw (M3x8)
	19	B9905SH	1	Push Nut

	Item	Part No.	Qty	Description
◎	20	B9906DA	1	Chart Cassette Assembly
	21	Y9400ET	1	Retainer E
	22	B9905EK	1	Latch
	23	B9905AZ	1	Shaft
◎	24	B9905FS	1	Front Cover
	25	B9905FT	1	Name Plate
	26	-	1	Name Plate
	27	-	-	Name Plate

Note:

◎ (CMP)

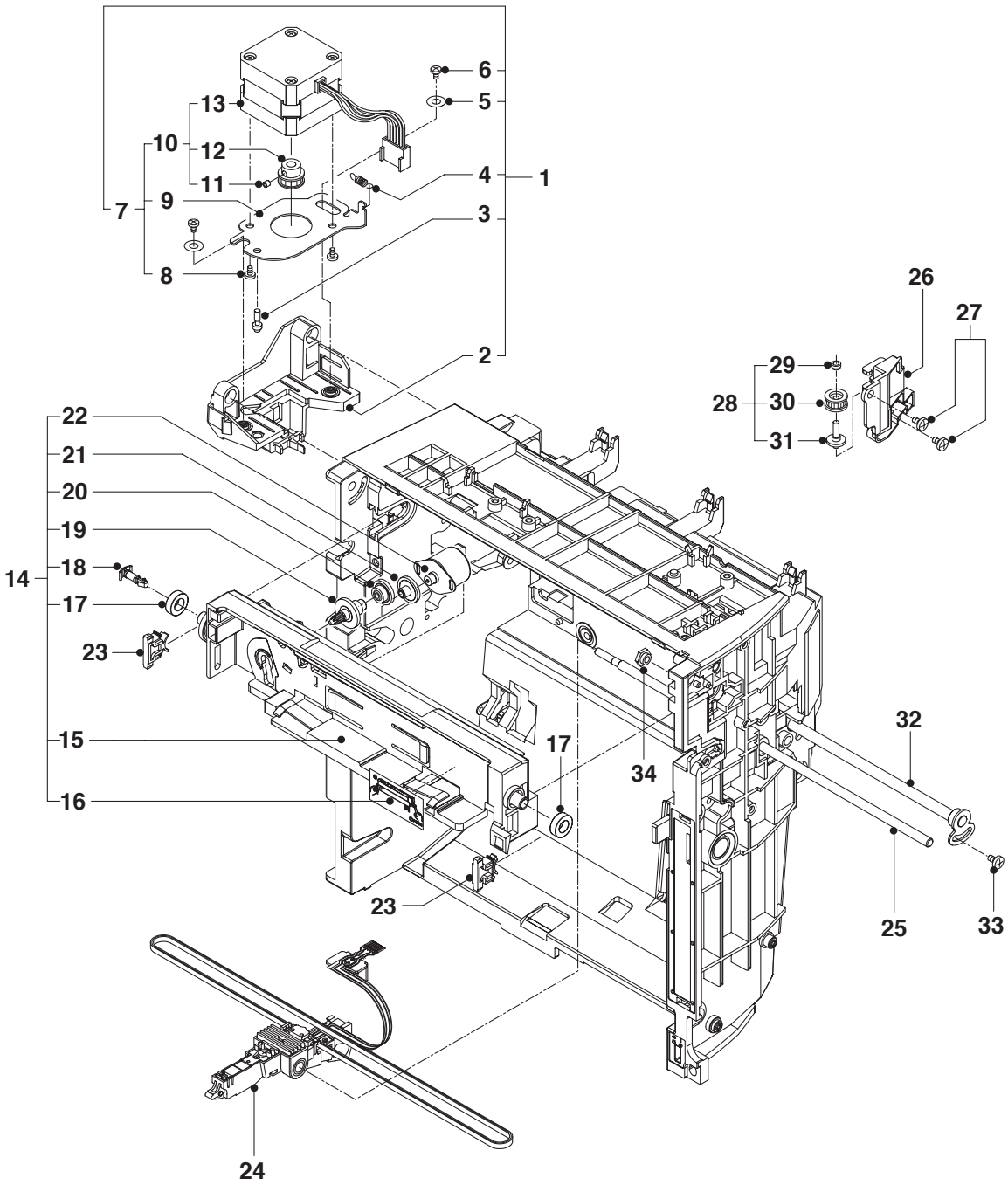
Frame and Chart Motor Assembly



Item	Part No.	Qty	Description
1	B8803SA	1	Dot Driver PCB
2	B9906RX	1	Shift Sensor Assembly
3	B9905PZ	1	FPC Clamp
4	B9905HT	2	Screw
5	Y9401CB	2	Nut (M4)
6	B8803BR	1	Ribbon Swing Assembly
7	B8803BS	1	Ribbon Swing Gear Assembly
8	B9906FS	1	Motor Assembly
9	B9905HK	2	Hinge Assembly
10	Y9405LB	4	Screw (M4x5)
11	B9905HQ	1	Plate
12	Y9305LB	2	Screw (M3x5)
13	B9905HS	5	Pin
14	B9905GW	1	Bracket
15	B9905GS	1	Motor Assembly
16	B9988DL	1	Tapping Screw
17	B9905GQ	1	Shaft
18	B9905GP	1	Shaft
19	B9905GM	2	Gear
20	B9905GN	1	Gear
21	B9905GF	1	Chart Feed Gear Assembly
22	B8802DR	1	CPU DR Joint FPC

Note:
◎ (CMP)

Frame and Carriage Assembly (1/2)

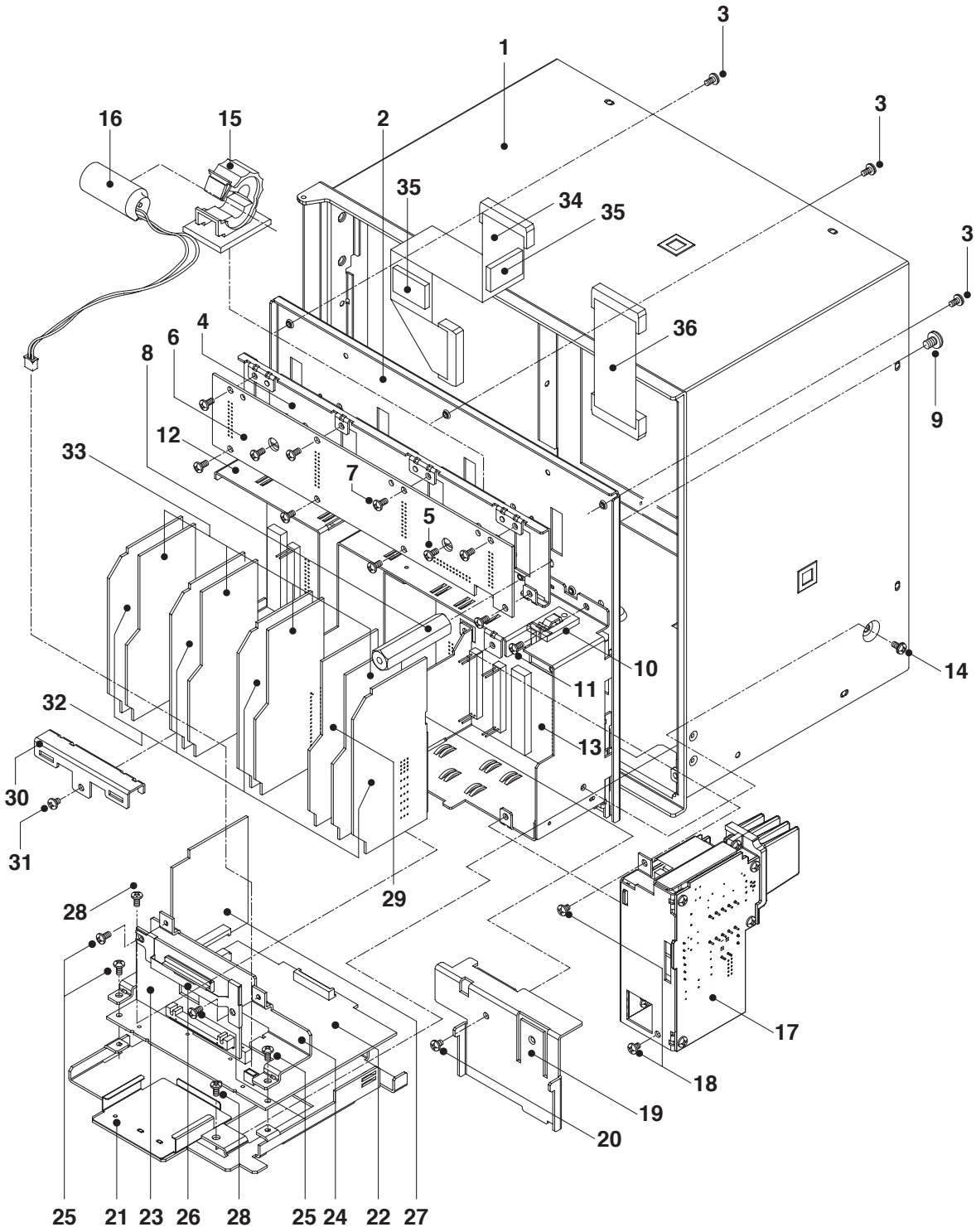


Frame and Carriage Assembly (2/2)

Item	Part No.	Qty Model 437106	437112	437118	437124	Description
1	B8803BG	1	1	1	1	Motor Bracket Assembly
2	B8803BH	1	1	1	1	Motor Bracket
3	B9906FJ	1	1	1	1	Shaft
4	B9906FK	1	1	1	1	Spring
5	Y9401WB	2	2	2	2	Washer
6	B9988DL	2	2	2	2	Screw (M3x4)
7	B9906FC	1	1	1	1	Motor Plate Assembly
8	Y9304LB	2	2	2	2	Screw (M3x4)
9	B9906FE	1	1	1	1	Plate
10	B9906FD	1	1	1	1	Motor Assembly
11	Y9303SJ	1	1	1	1	Set Screw (M3x3)
12	B9901ET	1	1	1	1	Drive Pulley
13	B9906FX	1	1	1	1	Motor
14	B8803AJ	1	1	1	1	Ribbon Holder Assembly
15	B8803BU	1	1	1	1	Ribbon Holder Assembly
16	B9906GP	1	1	1	1	Name Plate
17	B8803BX	2	2	2	2	Ribbon Holder Bearing
18	B9906GH	1	1	1	1	Latch
19	B9906GN	1	1	1	1	Gear
20	B9901HM	1	1	1	1	Gear
21	B9901HN	1	1	1	1	Gear
22	B9906GL	1	1	1	1	Motor Assembly
23	B9906GR	2	2	2	2	Holder Lock
24	B8803BB	1	1	1	1	Carriage Assembly
25	B8803BM	1	1	1	1	Main Shaft 18
26	B8803BK	1	1	1	1	Pulley Bracket
27	Y9305LB	2	2	2	2	Screw (M3x5)
28	B9906EY	1	1	1	1	Pulley Assembly
29	B9906FA	1	1	1	1	Collar
30	B9901EY	1	1	1	1	Pulley
31	B9906EZ	1	1	1	1	Shaft
32	B8803EM	1	1	1	1	Adjust Shaft Assembly
33	Y9305LB	1	1	1	1	Screw (M3x5)
34	B9906EW	1	1	1	1	Lever Nut

Note:
◎ (CMP)

CPU and Rear Panel Assembly (1/2)



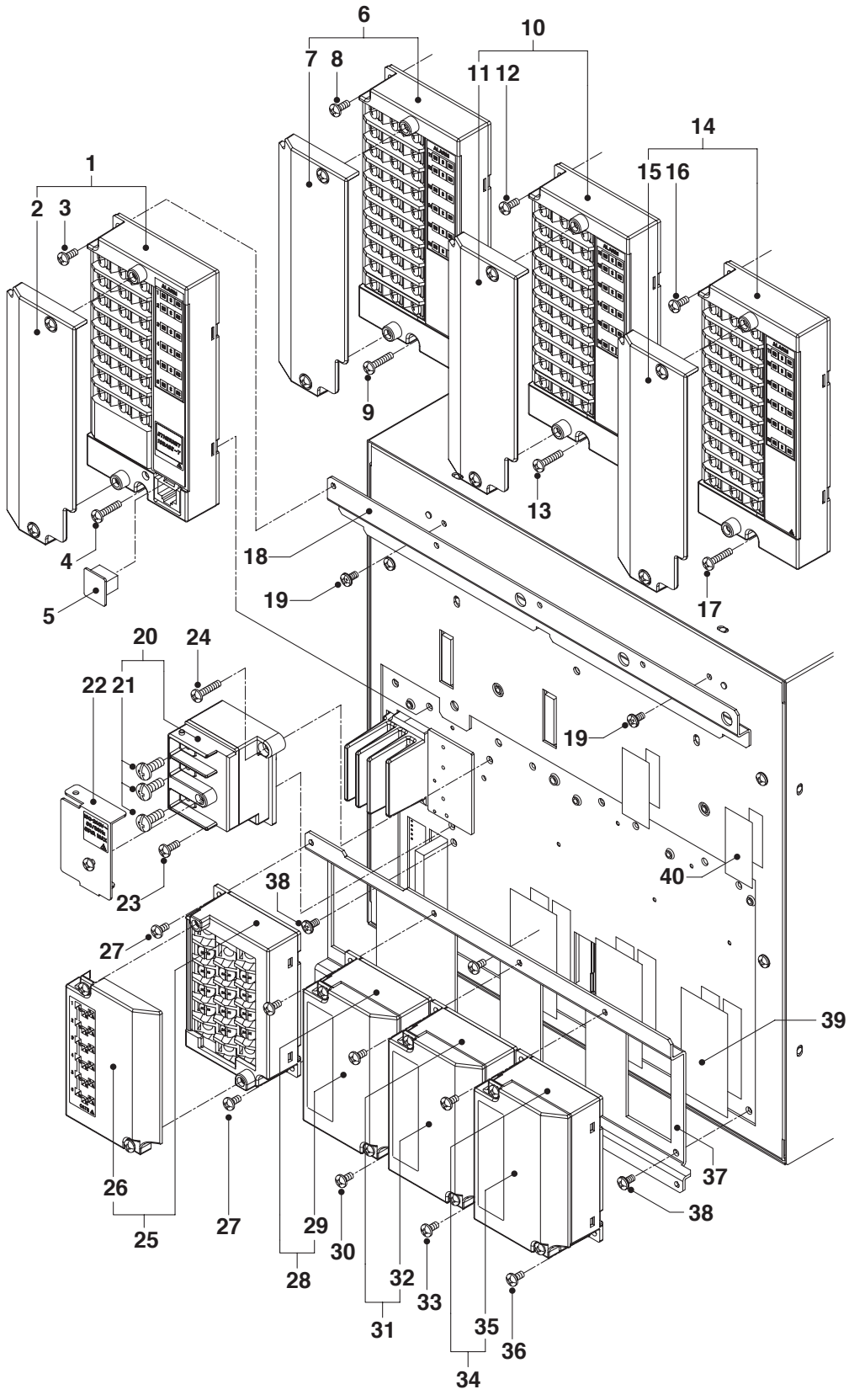
CPU and Rear Panel Assembly (2/2)

Item	Part No.	Model	Qty 437106	437112	437118	437124	Description
1	B8802BK		1	1	1	1	Case Assembly
2	B8803CA		1				Panel Assembly (not /N2, /P1)
	B8803CB			1			Panel Assembly (not /N2, /P1)
	B8803CC				1		Panel Assembly (not /N2, /P1)
	B8803CD					1	Panel Assembly (not /N2, /P1)
	B8803CE		1				Panel Assembly (/N2) (not /P1)
	B8803CF			1			Panel Assembly (/N2) (not /P1)
	B8803CG				1		Panel Assembly (/N2) (not /P1)
	B8803CH					1	Panel Assembly (/N2) (not /P1)
	B8803CJ		1				Panel Assembly (/P1) (not /N2)
	B8803CK			1			Panel Assembly (/P1) (not /N2)
	B8803CL				1		Panel Assembly (/P1) (not /N2)
	B8803CM					1	Panel Assembly (/P1) (not /N2)
	B8803CN		1				Panel Assembly (/N2, /P1)
	B8803CP			1			Panel Assembly (/N2, /P1)
	B8803CQ				1		Panel Assembly (/N2, /P1)
	B8803CR					1	Panel Assembly (/N2, /P1)
	-		1	1	1	1	Terminal Assembly (see page 6-25)
3	B9305LK		6	6	6	6	Screw (M3x5)
4	B8802FL		1	1	1	1	Option Bracket (select)
5	Y9305LB		2	2	2	2	Screw (M3x5) (select)
6	B8803SE		1	1	1	1	12 Option Mother PCB (or /A1/A2/A3/C3/C7/F1/R1) (not /A4/A5)
	B8803SE		1	1	1	1	12 Option Mother PCB (and /A4) (not /F1)
	B8803SF		1	1	1	1	24 Option Mother PCB (and /A4/F1)
	B8803SF		1	1	1	1	24 Option Mother PCB (and /A5) (not /F1)
7	Y9305LB		4	4	4	4	Screw (M3x5) (for B8803SE)
	Y9305LB		8	8	8	8	Screw (M3x5) (for B8803SF)
8	B9905RX		1	1	1	1	Rod
9	Y9405LB		1	1	1	1	Screw (M4x5)
10	A9099KY		3	3	3	3	Clamp
11	Y9305LB		5	5	5	5	Screw (M3x5) (select)
12	B8803DA				1	1	Bracket (select)
	Y9305LB				4	4	Screw (M3x5) (select)
13	B8803WB		1				6 Dot Mother PCB (not /N2)
	B8803SB			1			12 Dot Mother PCB (not /N2)
	B8803VC				1		18 Dot Mother PCB (not /N2)
	B8803SC					1	24 Dot Mother PCB (not /N2)
	B8803WC		1				6 Dot ISO Mother PCB (/N2)
	B8803WD			1			12 Dot ISO Mother PCB (/N2)
	B8803VD				1		18 Dot ISO Mother PCB (/N2)
	B8803SD					1	24 Dot ISO Mother PCB (/N2)
	Y9305LB		1	1	1	1	Screw (M3x5)
14	Y9305LK		1	1	1	1	Screw (M3x5)
15	B9905RW		1	1	1	1	Clamp
16	B9905WD		1	1	1	1	Battery Assembly
17	B8800JP		1	1	1	1	Power Assembly (not /P1)
	B8800JQ		1	1	1	1	Power Assembly (/P1)
18	Y9305LB		2	2	2	2	Screw (M3x5)
19	B8803DC		1	1			Board Bracket (select)
20	Y9305LB		1	1			Screw (M3x5) (select)
21	B8802BU		1	1	1	1	CPU Bracket Assembly
22	B8803VA		1	1	1	1	Dot 20 CPU Assembly
23	B8802SA		1	1	1	1	Joint Board PCB
24	B8802BX		1	1	1	1	Connector Bracket
25	Y9305LB		4	4	4	4	Screw (M3x5)
26	B8802BY		1	1	1	1	Guide Bracket
27	B8800SN		1	1	1	1	R422 COM PCB (/C3)
	B8800SP		1	1	1	1	Ether COM PCB (/C7)
28	Y9305LB		2	2	2	2	Screw (M3x5)
29	B8800SE		1	1	1	1	AD Board PCB
30	B8803DB				1	1	Board Bracket (select)
31	Y9305LB				1	1	Screw (M3x5) (select)
32	B8801SD		1	2	3	4	Dot STD. Scanner PCB
33	B8801SE		1	2	3	4	Dot ISO. Scanner PCB
34	B8802WA		1				Cable Assembly
35	A9099KY		2				Clamp
36	B8803WA			1	1	1	Cable Assembly

(select)

Note:
◎ (CMP)

Terminal Assembly (1/5)



Terminal Assembly (2/5)

Item	Part No.	Qty	Description	
1	B8800MA	1	Option Terminal Assembly *1,73	(select) (see page 6-27,28)
	B8800MB	1	Option Terminal Assembly *2,74	
	B8800MC	1	Option Terminal Assembly *3,15,16,17,18,75,86,87,88,89	
	B8800MD	1	Option Terminal Assembly *4	
	B8800ME	1	Option Terminal Assembly *5,76	
	B8800MF	1	Option Terminal Assembly *6,77	
	B8800MG	1	Option Terminal Assembly *7,78	
	B8800MH	1	Option Terminal Assembly *8,79	
	B8800MJ	1	Option Terminal Assembly *9,80	
	B8800MK	1	Option Terminal Assembly *10,19,20,21,22,81,90,91,92,93	
	B8800ML	1	Option Terminal Assembly *11,82	
	B8800MM	1	Option Terminal Assembly *12,83	
	B8800MN	1	Option Terminal Assembly *13,84	
	B8800MP	1	Option Terminal Assembly *14,85	
	B8800NA	1	Option Terminal Assembly *23	
	B8800NB	1	Option Terminal Assembly *24	
	B8800NC	1	Option Terminal Assembly *25,37,38,39,40	
	B8800ND	1	Option Terminal Assembly *26	
	B8800NE	1	Option Terminal Assembly *27	
	B8800NF	1	Option Terminal Assembly *28	
	B8800NG	1	Option Terminal Assembly *29	
	B8800NH	1	Option Terminal Assembly *30	
	B8800NJ	1	Option Terminal Assembly *31	
	B8800NK	1	Option Terminal Assembly *32,41,42,43,44	
	B8800NL	1	Option Terminal Assembly *33	
	B8800NM	1	Option Terminal Assembly *34	
	B8800NN	1	Option Terminal Assembly *35	
	B8800NP	1	Option Terminal Assembly *36	
◎ 2	B8800KG	1	Option Cover Assembly	
3	Y9308LB	1	Screw (M3x8)	
4	Y9318LB	1	Screw (M3x18)	
5	A1447JZ	1	Access of Conn	
6	B8802GA	1	Option Terminal Assembly *45,47,49,51,94,96	(select)
	B8802GB	1	Option Terminal Assembly *53 to *64,*98 to *103	
◎ 7	B8800KG	1	Option Cover Assembly	
8	Y9308LB	1	Screw (M3x8)	
9	Y9318LB	1	Screw (M3x18)	
10	B8802GA	1	Option Terminal Assembly *46,48,50,52,95,97	(select)
	B8803FA	1	Option Terminal Assembly *65,66,67,68,104,105	
◎ 11	B8800KG	1	Option Cover Assembly	
12	Y9308LB	1	Screw (M3x8)	
13	Y9318LB	1	Screw (M3x18)	
14	B8803FB	1	Option Terminal Assembly *69,70,71,72,106,107	
◎ 15	B8800KG	1	Option Cover Assembly	
16	Y9308LB	1	Screw (M3x8)	
17	Y9318LB	1	Screw (M3x18)	
18	B9905BN	1	Bracket	
19	Y9305LK	2	Screw (M3x5)	
20	B8800JJ	1	Terminal Assembly (not /P1)	(select)
	B8800JK	1	Terminal Assembly (/P1)	
◎ 21	E9655FX	3	Screw	
◎ 22	B8802AJ	1	Cover Assembly (not /P1, /H5[ ])	(select)
	B8802AK	1	Cover Assembly (/P1) (not /H5[ ])	
23	Y9305LB	1	Screw (M3x5)	
24	Y9310LB	1	Screw (M3x10) (not /H5[ ])	(select)
	Y9314LB	1	Screw (M3x14) (/H5[ ])	

Note:

◎ (CMP)

Terminal Assembly (3/5)

	Item	Part No.	Qty	Description	
	25	B8801CV	1	Input Terminal Assembly (not /H2/N2)	(select)
		B8801CX	1	Input Terminal Assembly (/N2)	
		B8801CY	1	Input Terminal Assembly (/H2)	
◎	26	B9901JC	1	Input Cover Assembly (not /H2/N2)	(select)
		B9901JD	1	Input Cover Assembly (/N2)	
		B9901JP	1	Input Cover Assembly (/H2)	
	27	Y9306LB	2	Screw (M3x6)	
	28	B8803EA	1	Input Terminal Assembly (not /H2/N2)	(select)
		B8803ED	1	Input Terminal Assembly (/N2)	
		B8803EG	1	Input Terminal Assembly (/H2)	
◎	29	B9906KK	1	Input Cover Assembly (not /H2/N2)	(select)
		B9906KN	1	Input Cover Assembly (/N2)	
		B9906LA	1	Input Cover Assembly (/H2)	
	30	Y9306LB	2	Screw (M3x6)	
	31	B8803EB	1	Input Terminal Assembly (not /H2/N2)	(select)
		B8803EE	1	Input Terminal Assembly (/N2)	
		B8803EH	1	Input Terminal Assembly (/H2)	
◎	32	B9906KL	1	Input Cover Assembly (not /H2/N2)	(select)
		B9906KP	1	Input Cover Assembly (/N2)	
		B9906LB	1	Input Cover Assembly (/H2)	
	33	Y9306LB	2	Screw (M3x6)	
	34	B8803EC	1	Input Terminal Assembly (not /H2/N2)	(select)
		B8803EF	1	Input Terminal Assembly (/N2)	
		B8803EJ	1	Input Terminal Assembly (/H2)	
◎	35	B9906KM	1	Input Cover Assembly (not /H2/N2)	(select)
		B9906KQ	1	Input Cover Assembly (/N2)	
		B9906LC	1	Input Cover Assembly (/H2)	
	36	Y9306LB	2	Screw (M3x6)	
	37	B9905CR	1	Bracket (437106,437112)	(select)
		B9906CA	1	Bracket (437118,437124)	
	38	Y9305LK	2	Screw (M3x5)	
	39	B8802BJ	3	Sheet (437106)	(select)
		B8802BJ	2	Sheet (437112)	
		B8802BJ	1	Sheet (437118)	
	40	B9900BT	1-3	Name Plate (select)	

Note:

◎ (CMP)

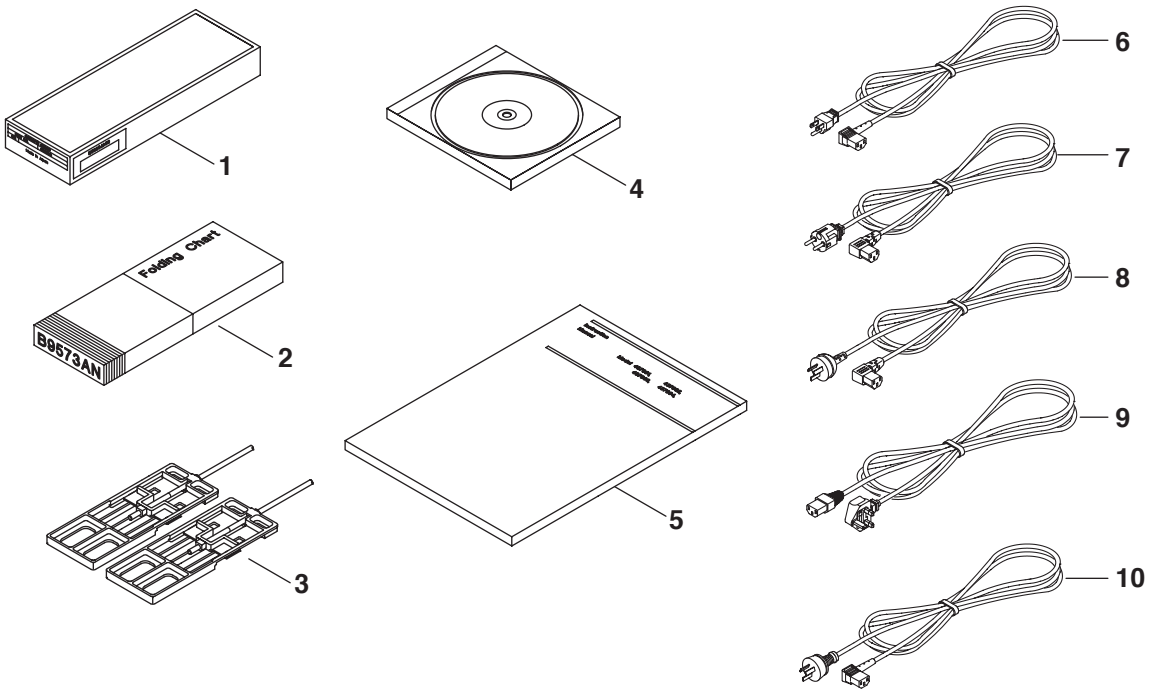
Terminal Assembly (4/5)

Option Terminal	Suffix Code (options)						
B8800MA	/A1			/C3			*1
B8800MB	/A2			/C3			*2
B8800MC	/A3			/C3			*3
B8800MD				/C3			*4
B8800ME		/F1		/C3			*5
B8800MF	/A1	/F1		/C3			*6
B8800MG	/A2	/F1		/C3			*7
B8800MH	/A1		/R1	/C3			*8
B8800MJ	/A2		/R1	/C3			*9
B8800MK	/A3		/R1	/C3			*10
B8800ML			/R1	/C3			*11
B8800MM		/F1	/R1	/C3			*12
B8800MN	/A1	/F1	/R1	/C3			*13
B8800MP	/A2	/F1	/R1	/C3			*14
B8800MC	/A3	/F1		/C3			*15
B8800MC	/A4			/C3			*16
B8800MC	/A4	/F1		/C3			*17
B8800MC	/A5			/C3			*18
B8800MK	/A3	/F1	/R1	/C3			*19
B8800MK	/A4		/R1	/C3			*20
B8800MK	/A4	/F1	/R1	/C3			*21
B8800MK	/A5		/R1	/C3			*22
B8800NA	/A1				/C7		*23
B8800NB	/A2				/C7		*24
B8800NC	/A3				/C7		*25
B8800ND					/C7		*26
B8800NE		/F1			/C7		*27
B8800NF	/A1	/F1			/C7		*28
B8800NG	/A2	/F1			/C7		*29
B8800NH	/A1		/R1		/C7		*30
B8800NJ	/A2		/R1		/C7		*31
B8800NK	/A3		/R1		/C7		*32
B8800NL			/R1		/C7		*33
B8800NM		/F1	/R1		/C7		*34
B8800NN	/A1	/F1	/R1		/C7		*35
B8800NP	/A2	/F1	/R1		/C7		*36
B8800NC	/A3	/F1			/C7		*37
B8800NC	/A4				/C7		*38
B8800NC	/A4	/F1			/C7		*39
B8800NC	/A5				/C7		*40
B8800NK	/A3	/F1	/R1		/C7		*41
B8800NK	/A4		/R1		/C7		*42
B8800NK	/A4	/F1	/R1		/C7		*43
B8800NK	/A5		/R1		/C7		*44
B8802GA	/A3	/F1		/C3			*45
B8802GA	/A4	/F1		/C3			*46
B8802GA	/A3	/F1	/R1	/C3			*47
B8802GA	/A4	/F1	/R1	/C3			*48
B8802GA	/A3	/F1			/C7		*49
B8802GA	/A4	/F1			/C7		*50
B8802GA	/A3	/F1	/R1		/C7		*51
B8802GA	/A4	/F1	/R1		/C7		*52
B8802GB	/A4			/C3			*53
B8802GB	/A5			/C3			*54
B8802GB	/A4	/F1		/C3			*55
B8802GB	/A4		/R1	/C3			*56
B8802GB	/A4	/F1	/R1	/C3			*57
B8802GB	/A5		/R1	/C3			*58
B8802GB	/A4				/C7		*59
B8802GB	/A5				/C7		*60
B8802GB	/A4	/F1			/C7		*61
B8802GB	/A4		/R1		/C7		*62
B8802GB	/A4	/F1	/R1		/C7		*63
B8802GB	/A5		/R1		/C7		*64
B8803FA	/A5			/C3			*65
B8803FA	/A5		/R1	/C3			*66
B8803FA	/A5				/C7		*67
B8803FA	/A5		/R1		/C7		*68
B8803FB	/A5			/C3			*69
B8803FB	/A5		/R1	/C3			*70
B8803FB	/A5				/C7		*71
B8803FB	/A5		/R1		/C7		*72

Terminal Assembly (5/5)

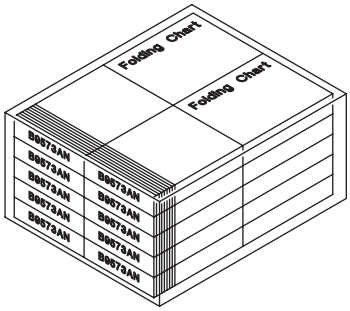
Option Terminal	Suffix Code (options)						
B8800MA	/A1						*73
B8800MB	/A2						*74
B8800MC	/A3						*75
B8800ME		/F1					*76
B8800MF	/A1	/F1					*77
B8800MG	/A2	/F1					*78
B8800MH	/A1		/R1				*79
B8800MJ	/A2		/R1				*80
B8800MK	/A3		/R1				*81
B8800ML			/R1				*82
B8800MM		/F1	/R1				*83
B8800MN	/A1	/F1	/R1				*84
B8800MP	/A2	/F1	/R1				*85
B8800MC	/A3	/F1					*86
B8800MC	/A4						*87
B8800MC	/A4	/F1					*88
B8800MC	/A5						*89
B8800MK	/A3	/F1	/R1				*90
B8800MK	/A4		/R1				*91
B8800MK	/A4	/F1	/R1				*92
B8800MK	/A5		/R1				*93
B8802GA	/A3	/F1					*94
B8802GA	/A4	/F1					*95
B8802GA	/A3	/F1	/R1				*96
B8802GA	/A4	/F1	/R1				*97
B8802GB	/A4						*98
B8802GB	/A5						*99
B8802GB	/A4	/F1					*100
B8802GB	/A4		/R1				*101
B8802GB	/A4	/F1	/R1				*102
B8802GB	/A5		/R1				*103
B8803FA	/A5						*104
B8803FA	/A5		/R1				*105
B8803FB	/A5						*106
B8803FB	/A5		/R1				*107

Standard Accessories



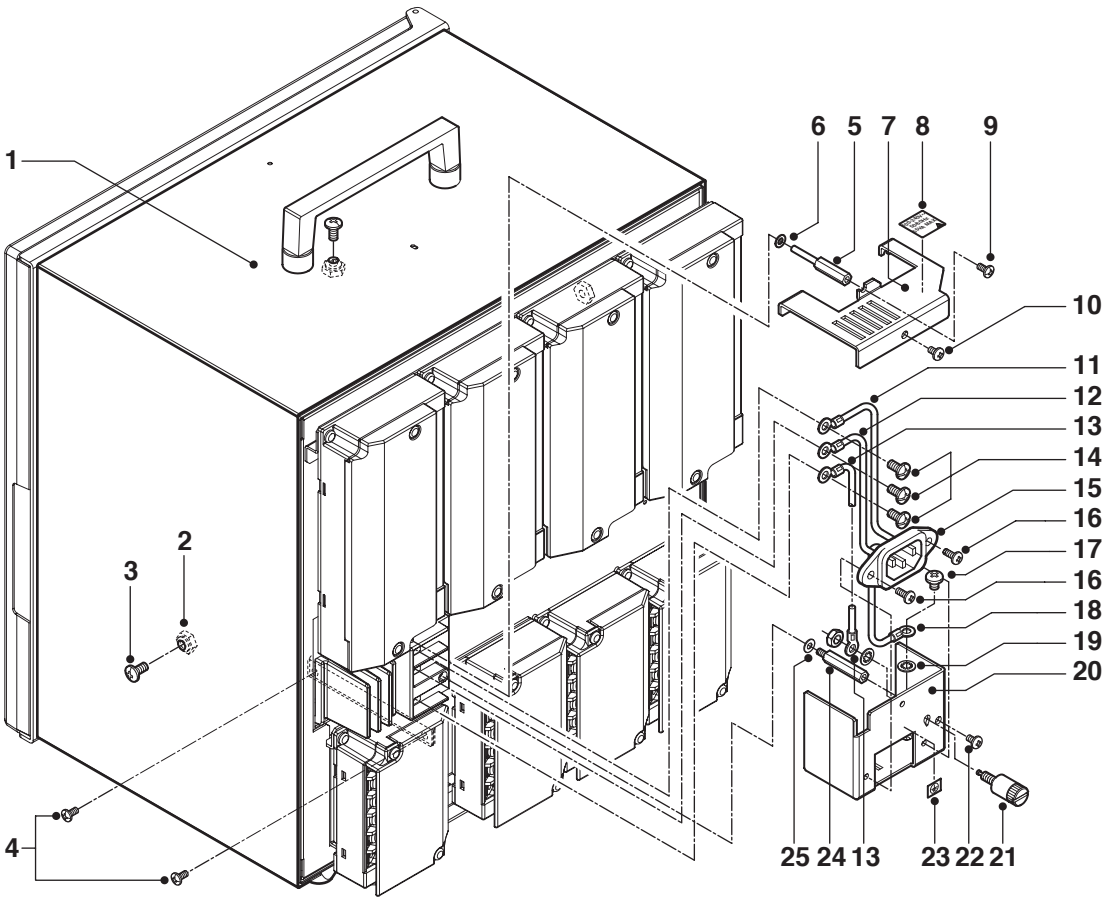
Item	Part No.	Qty	Description	
1	B9906JA	1	Ribbon Cassette	
2	B9573AN	1	Chart *1	
3	B9900BX	2	Bracket Assembly (not /H5[ ])	
4	B8800LZ	1	CD-ROM for Manuals	
5	–	1	Manuals	
6	A1006WD	1	Power Cord Set (/H5D) (UL,CSA standard)	(select)
7	A1009WD	1	Power Cord Set (/H5F) (VDE standard)	
8	A1064WD	1	Power Cord Set (/H5H) (GB standard)	
9	A1023WD	1	Power Cord Set (/H5J) (BS standard)	
10	A1024WD	1	Power Cord Set (/H5R) (AS standard)	

Spares



Note: *1 Part number: B9573AN□
Minimum order quantity 10 units□
(1 chart / unit)

Portable Type (/H5[ ])



Item	Part No.	Qty	Description
1	B8802GE	1	Cover Assembly
2	B9905KX	3	Collar
3	Y9406LB	3	Screw (M4x6)
4	Y9304LB	2	Screw (M3x4)
5	B9905KV	1	Rod (/A1, /A2, /A3, /A4, /A5, /C3, /C7, /F1, /R1) } (select)
	B9905KY	1	Stud (not /A1, /A2, /A3, /A4, /A5, /C3, /C7, /F1, /R1) } (select)
6	Y9725YA	1	Spacer (not /A1, /A2, /A3, /A4, /A5, /C3, /C7, /F1, /R1)
7	B8802GG	1	Cover
8	B8802AD	1	Name Plate
9	Y9304LB	1	Screw (M3x4)
10	Y9304LK	1	Screw (M3x4)
11	B9902LK	1	Wire Assembly (Black)
12	B9902LJ	1	Wire Assembly (White)
13	B9902LL	1	Wire Assembly (Green)
14	E9655FX	(3)	Screw
15	A1017JS	1	Socket
16	Y9306LB	2	Screw (M3x6)
17	Y9405LB	1	Screw (M4x5)
18	B9902LN	1	Wire Assembly (Green)
19	Y9401WL	1	Washer
20	B8800LH	1	Bracket
21	A9019ZH	1	Terminal Assembly
22	Y9304LB	1	Screw (M3x4)
23	B9529AU	1	Name Plate
24	B9902LM	1	Rod
25	Y9301WB	1	Washer

Note:
◎ (CMP)

7.1 Before Replacing Parts

Notes When Replacing Parts

- Replacement of parts can only be performed by properly trained personnel.
- This section describes disassembly of the instrument. Refer to the disassembly procedures when reassembling.
- If parts other than the chart paper, pens, ribbon cassette, and internal light LED are replaced, the instrument is no longer warranted by YOKOGAWA.

WARNING

Remove all wires and cables from the recorder and turn OFF the power switch before attempting any disassembly or assembly. Certain parts of the recorder carry high voltages.

CAUTION

- The internal circuitry is vulnerable to damage from static electricity. Take appropriate measures to ensure that static electricity does not flow to the internal circuits.
- Plastic molded framing with latches are used to secure components. Applying excessive force to latches can cause them to break.

Testing after Replacement of Parts

When replacing the parts other than the chart paper, pens, ribbon cassette, and internal light LED, be sure to check them by performing the insulation resistance test, withstand voltage test, and protective grounding function (see chapter 3).

Torque Driver and Tightening Torque

Torque Driver

The recorder uses M2.3, M3, and M4 + screws. Use the appropriate screw driver for each type of screw.

Screw Tightening Torque

- Tighten screws with the torque below unless a different torque is specified in a particular instruction. In that case, use the specified torque instead.

Screw Diameter	Tightening Torque	Bit No.
M2.3	0.17 to 0.23 N·m	#1
M3	0.59 to 0.69 N·m	#2
M4	1.37 to 1.47 N·m	#2

- The screw tightening torque for the Input Terminal Assembly, Option Terminal Assembly, and Mother Board Assembly is 0.39 to 0.49 N·m.

7.2 Replacable Parts

The recommended replacement periods for wearable parts (ones with limited lifespans) is given in the table below. The replacement periods are based on standard operating conditions. The actual replacement period should be determined depending on the actual operating conditions.

Pen Model

Item	Replacement Period	Part Name	Part No.	Note	Quantity Used
Z-fold chart paper	41 days	Chart	B9573AN	When used at 20 mm/h	1
Felt pen	2 km	Pen Assembly	B9902AM B9902AN B9902AP B9902AQ	Red Green Blue Violet At a pen speed of 10 cm/s	1 each
Plotter pen	100,000 characters	Pen Assembly	B9902AR	When printing continuously	1
Display	5 years*	Display Assembly	B8802CA		1
Chart paper feed motor	5 years	Motor Assembly	B9905GS		1
Plotter carriage	5 years	Carriage Assembly	B9905NB		1
Plotter motor	5 years	Motor Assembly	B9905NS	For the X-axis	1
Lever bearing	5 years	Lever Assembly	B9900RH	For the plotter	1
Pen servo	5 years	Pen Servo Assembly	B8802EF	Shared by all pens (excludes the Pen Arm Assembly)	1 to 4
Internal light LED	2 years*	LED Assembly	B8800CR		2

* The half life of the brightness at the factory default brightness setting.

Dot Model

Item	Replacement Period	Part Name	Part No.	Note	Quantity Used
Z-fold chart paper	41 days	Chart	B9573AN	When used at 20 mm/h	1
Ribbon cassette	3 months	Ribbon Cassette	B9906JA		1
Display	5 years*	Display Assembly	B8802CA		1
Chart paper feed motor		Motor Assembly	B9905GS		1
Pulley	3 years	Pully	B9901EY	For the carriage	1
Carriage motor	5 years	Motor Assembly	B9906FX		1
Carriage	5 years	Carriage Assembly	B8803BB		1
Ribbon shift motor	5 years	Motor Assembly	B9906FS		1
Ribbon shift gear box	5 years	Ribbon Swing Gear Assembly	B8803BS		1 each
Ribbon feed motor	5 years	Motor Assembly	B9906GL		1
Ribbon feed gear	5 years	Gear	B9906GN B9901HM B9901HN		1 each
Internal light LED	2 years*	LED Assembly	B8800CR		1

* The half life of the brightness at the factory default brightness setting.

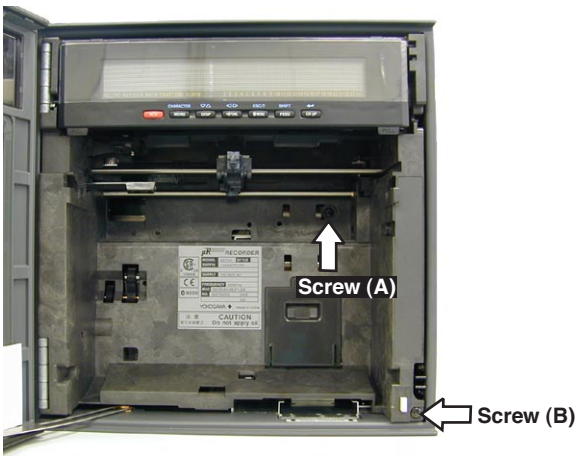
For information on replacing the parts in the shaded area, see the *μR20000 Recorder user's manual* (IM 04P02B01-01E).

7.3 Disassembly Procedure (Common Items)

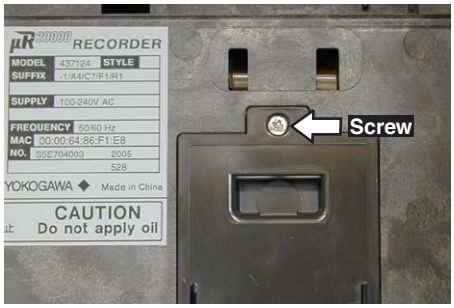
This is a description of the disassembly procedures that are common to the dot and pen models. The photographs are of the dot model, but the pen model has the same structure and the same procedures can be used.

Internal Unit - Frame Assembly [Item 10 on pages 6-2 and 6-16]

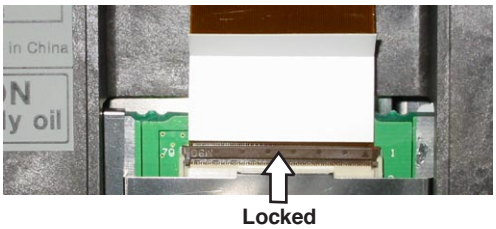
1. Remove the Chart Cassette Assembly.
2. Sufficiently loosen screw (A), then remove screw (B).
   (Screw tightening torque: 0.88 to 0.98 N·m).

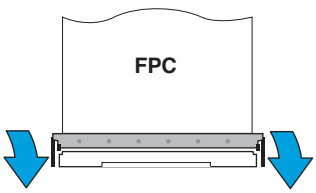


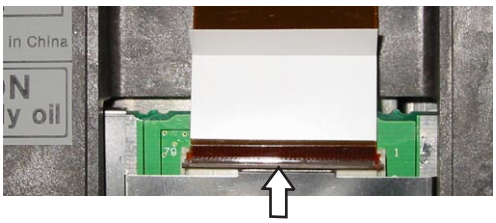
3. Sufficiently loosen the screw that holds down the cover, then open the cover.
   (Screw tightening torque: 0.59 to 0.69 N·m).



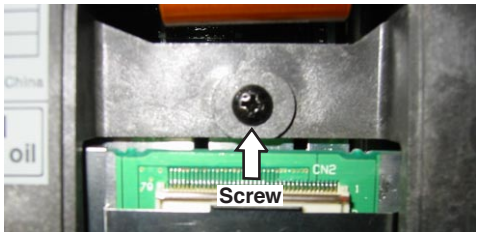
4. Release the lock on the Joint Board PCB connector (CN2) and remove the FPC from the connector.

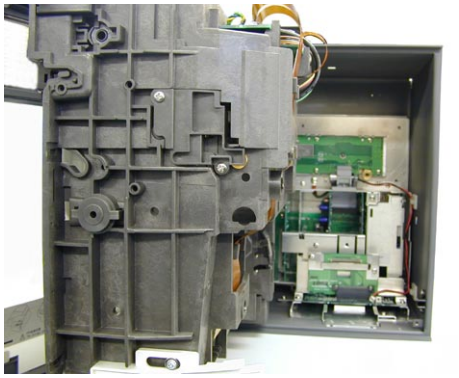






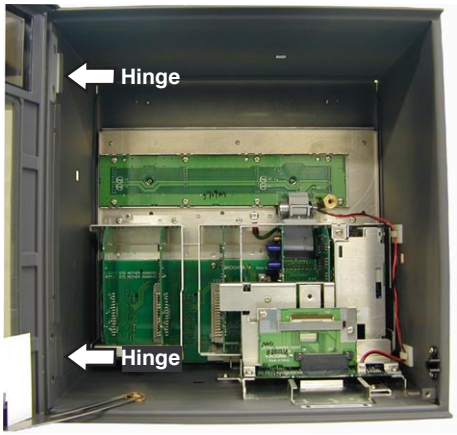
5. Loosen the screw on the back of the FPC and open the internal unit.
(Screw tightening torque: 0.88 to 0.98 N·m).





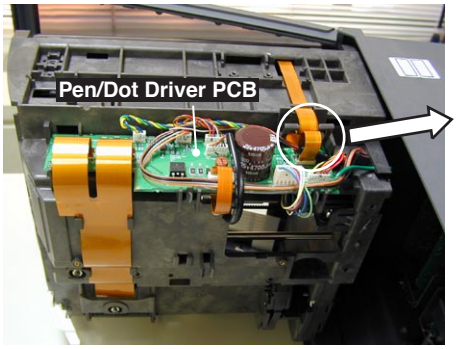
Remove the Internal Unit

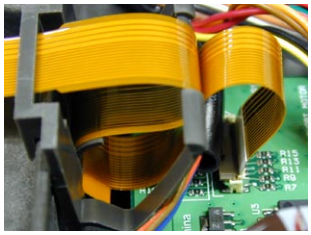
6. Remove the four screws from the hinges, and remove the internal unit from the case.
(Screw tightening torque: 1.37 to 1.47 N·m).

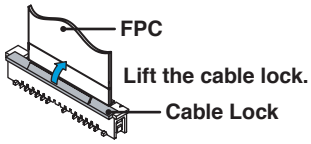


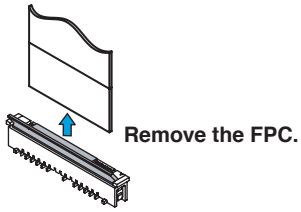
Display Assembly (B8802CA) [Item 1 on pages 6-4 and 6-18]

1. Open the internal unit.
2. Remove the Display Assembly FPC from the Pen Driver PCB (CN5)/Dot Driver PCB (CN7).

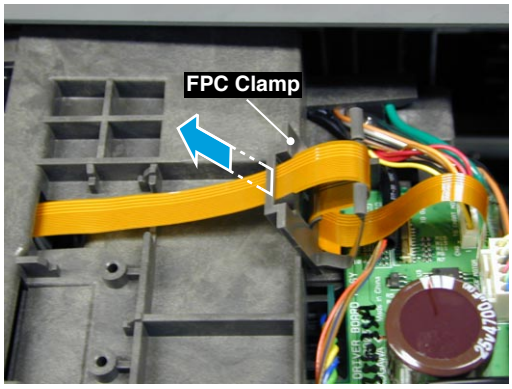






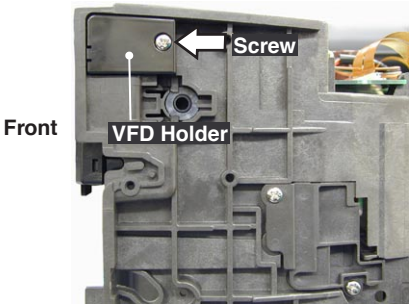


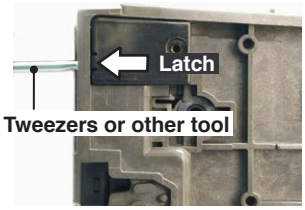
3. Remove the FPC Clamp from the internal unit, and pull the FPC out from the FCP Clamp.



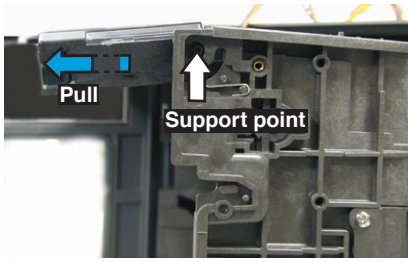
FPC Clamp and FPC as a set

4. Remove the screw securing the VFD Holder, press the VFD Holder latch with a pair of tweezers, then remove the VFD Holder.
(Screw tightening torque: 0.59 to 0.69 N·m).





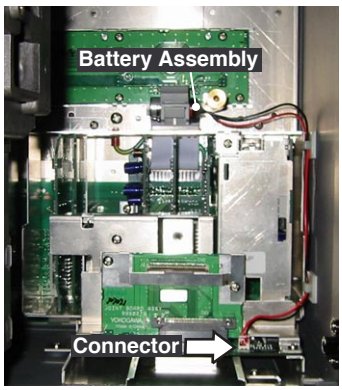
5. Pull the Display Assembly toward you, then pull the support point on the right side of the Display Assembly.



6. Remove the Display Assembly.

Battery Assembly (B9905WD) [Item 15 on page 6-8 and item 16 on page 6-22]

1. Open the internal unit.
2. Remove the Battery Assembly cable while holding down the CPU Assembly connector (CN1) and cable.



3. Release the Clamp latch, then remove the Battery Assembly.

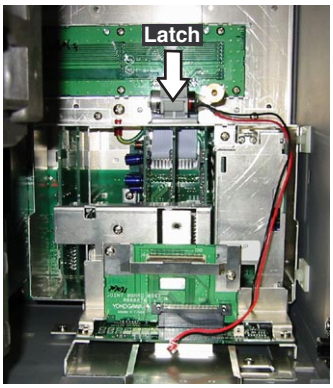
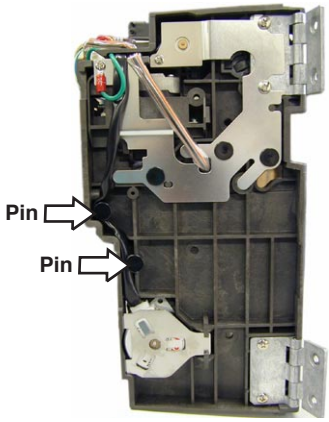
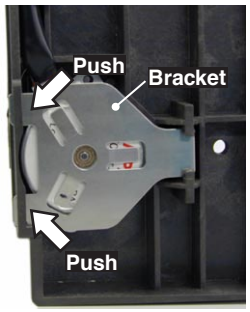


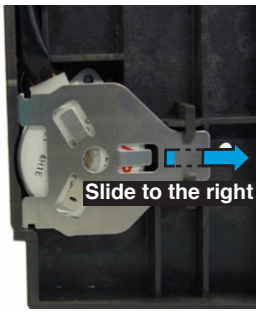
Chart Paper Feed Motor (B9905GS) [Item 11 on page 6-5 and itme 15 on page 6-19]

1. Remove the internal unit.
2. Remove the Motor Assembly cable from the Pen Driver PCB (CN8)/Dot Driver PCB (CN9).
3. Remove the pins from the two locations while holding the Motor Assembly cable.



4. Push the left edge of the bracket, then slide the entire bracket to the right while releasing the latch, and remove the bracket.



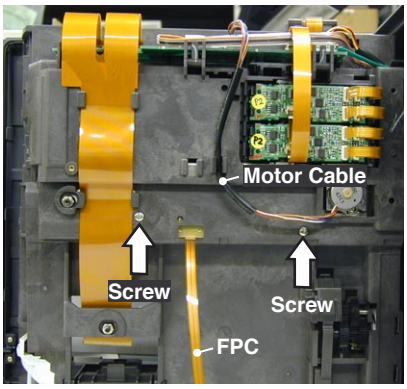


5. Remove the screw securing the Motor Assembly, then remove the Motor Assembly.
(Screw tightening torque: 0.59 to 0.69 N·m).

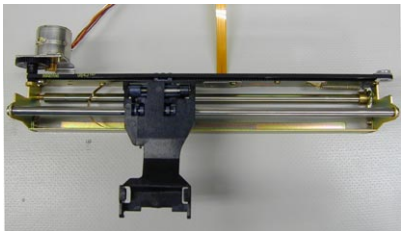
7.4 Disassembly Procedure (Pen Model)

Plotter Carriage (B9905NB) **[Item 22 on page 6-6]**
Plotter Motor (B9905NS) **[Item 27 on page 6-6]**
Lever Assembly (B9900RH) **[Item 39 on page 6-6]**

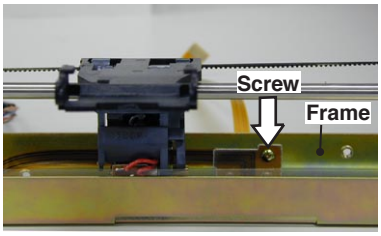
1. Open the internal unit.
2. Remove the Motor Cable extruding from the Plotter Assembly from the Pen Driver PCB (CN3 and CN4).
3. Remove the two screws securing the Plotter Assembly.
   (Screw tightening torque: 0.59 to 0.69 N·m).



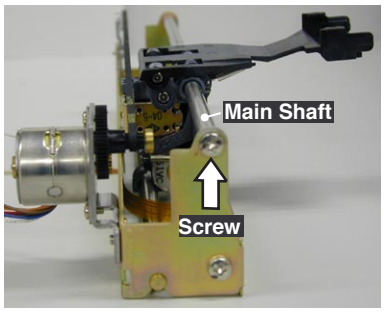
4. Pull out the Plotter Assembly.

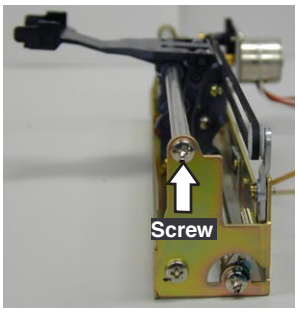


5. Remove the screw securing the FPC, then peel the FPC off of the frame (the FPC and Frame are secured with double-sided tape).
   (Screw tightening torque: 0.20 to 0.26 N·m).

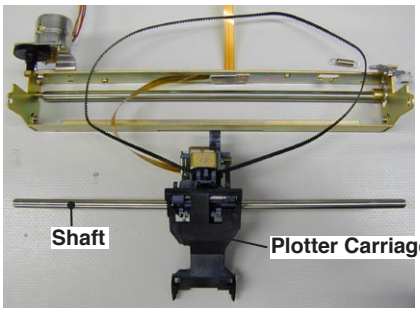


6. Remove the two screws securing the Shaft.
(Screw tightening torque: 0.59 to 0.69 N·m).



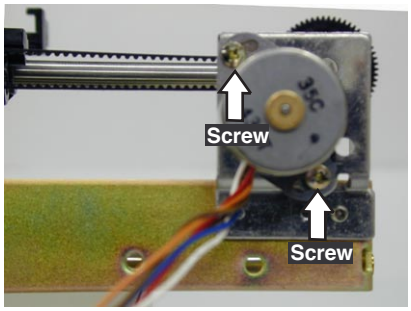


7. Remove the Belt, then pull the Frame to widen, and remove the Shaft.



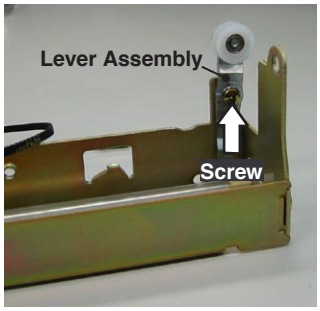
Removing the Plotter Motor

8. Remove the two screws securing the Plotter Motor.
(Screw tightening torque: 0.20 to 0.26 N·m).



Removing the Lever Assembly

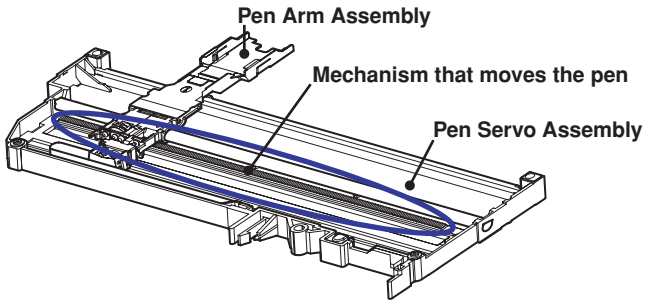
8. Remove the screw securing the Lever Assembly.
(Screw tightening torque: 0.20 to 0.26 N·m).



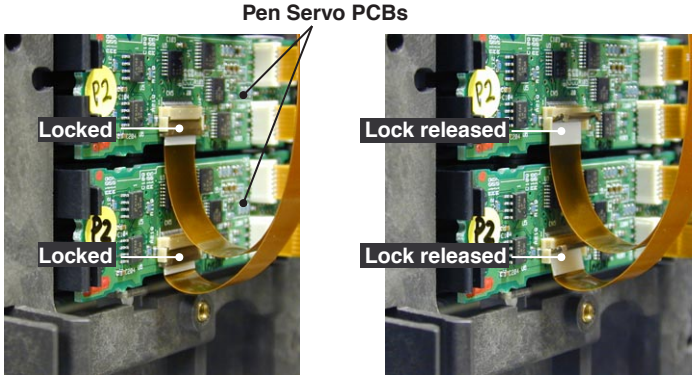
Pen Servo Assembly (B8802EF) [Item 2 on page 6-6]

CAUTION

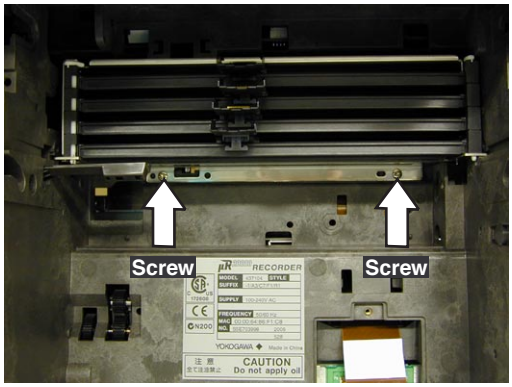
- If any foreign material adheres to the mechanism of the Pen Servo Assembly that moves the pen carriage, malfunction can occur.
- If any foreign material adheres to the bottom of the Pen Servo Assembly, that foreign material can fall onto components during assembly and cause malfunction.
- Before assembly, visually inspect the mechanism that moves the pens and the bottom to confirm that no foreign materials have accumulated, and if necessary, use an air blower to clean the affected areas.



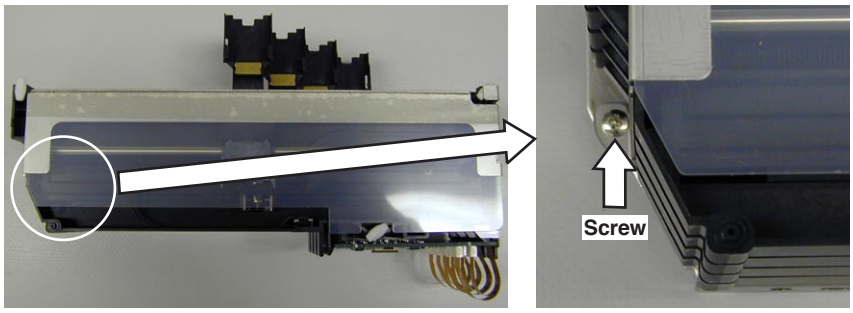
1. Open the internal unit.
2. Remove the Plotter Assembly.
3. Remove the Pen Driver PCB FPC from the Pen Servo PCBs (CN5).



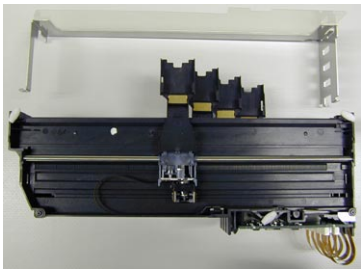
4. Remove the two screws securing the Pen Servo Assembly, then pull out the assembly.
   (Screw tightening torque: 0.59 to 0.69 N·m).



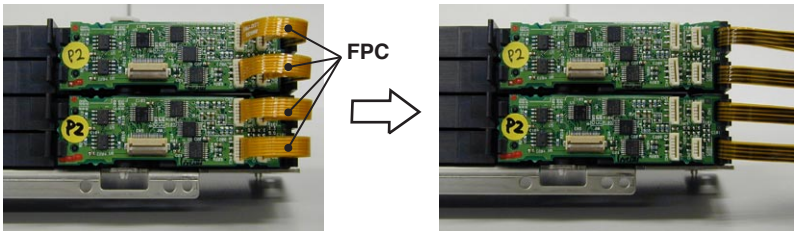
5. Remove the screw securing the Pen Base Bracket and Servo Top Cover. (Screw tightening torque: 0.39 to 0.49 N·m).



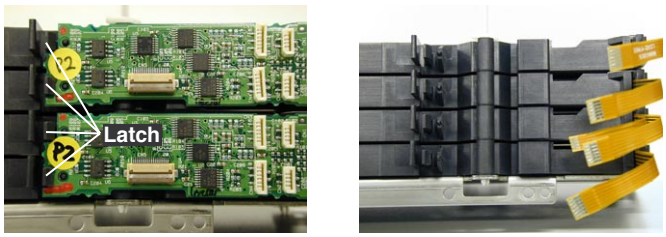
6. Remove the Servo Top Cover from the Pen Base Bracket.



7. Remove the FPCs connected to the Pen Servo PBCs.



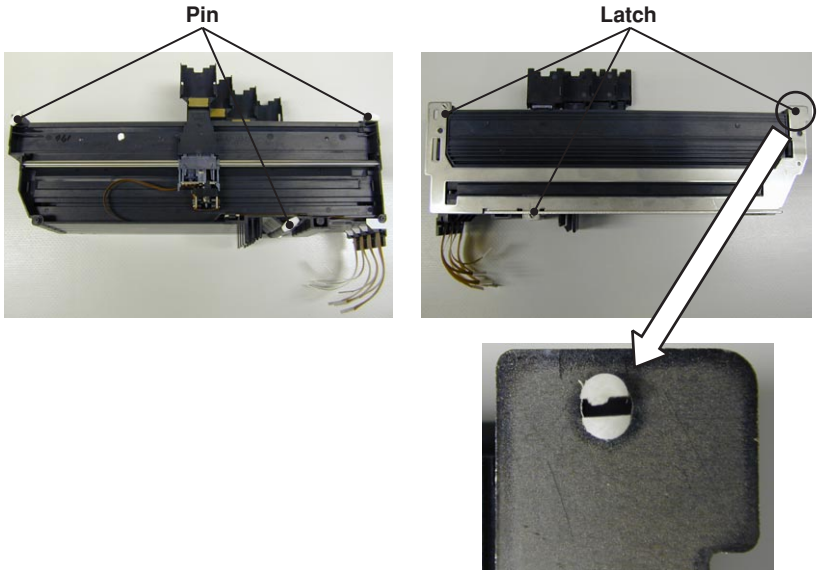
8. Remove the Pen Servo PCBs which are secured by latches to the Pen Servo Assembly.



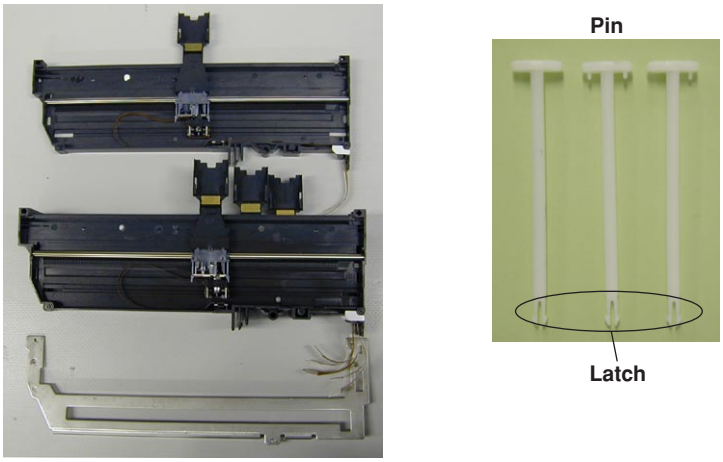
Note

The connectors connected to the FPCs from the Pen Servo Assembly on the Pen Servo PCBs do not have a locking mechanism. Inserting and removing them repeatedly can result in worn and defective contacts.

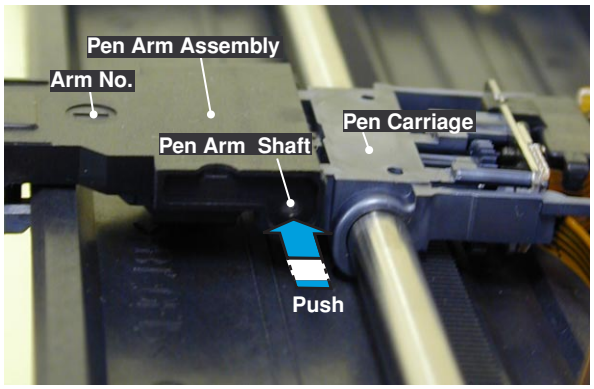
9. Remove the three pins securing the Pen Servo Assembly.
The tips of the pins form latches. To remove them, squeeze the tips using a pair of tweezers, then pull out the pins.



10. Remove the Pins from the Pen Base Bracket, then remove the Pen Servo Assembly.



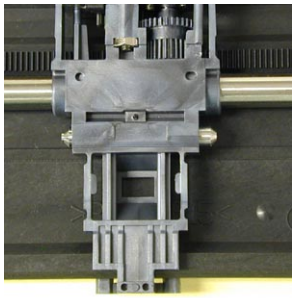
11. Remove the Pen Arm Assembly while pushing the Pen Arm Shaft of the Pen Servo Assembly.

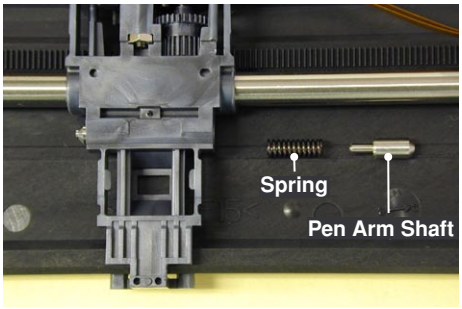


Note

An Arm number is indicated on the Pen Arm Assembly. Attach each pen correctly. If the pens are attached incorrectly, the Pens will interfere with each other.

12. Pull out the Pen Arm Shaft and Spring from the Pen Carriage.



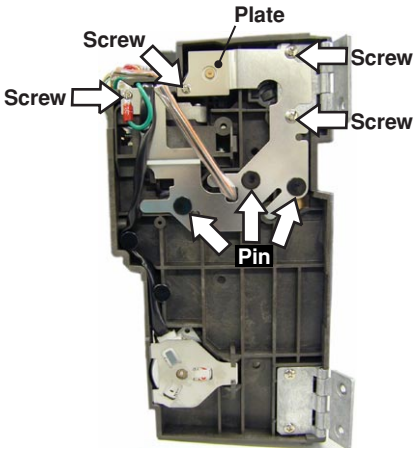


7.5 Disassembly Procedure (Dot Model)

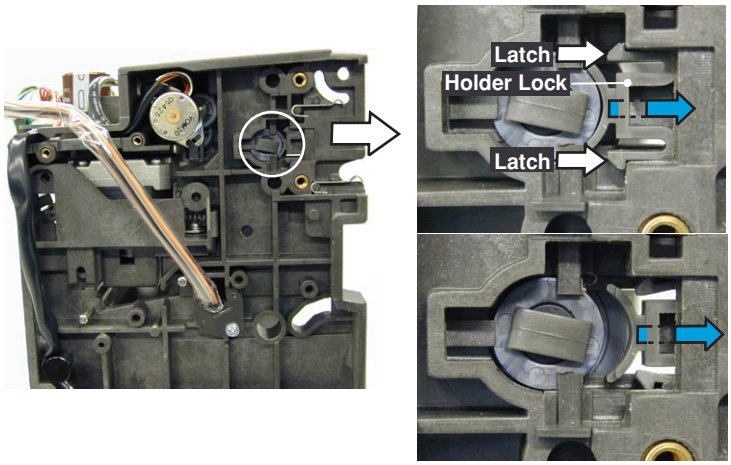
Ribbon Feed Motor (B9906GL) [Item 22 on page 6-20]
Ribbon Feed Gear (B9906GN, B9901HM, B9901HN) [Items 19 to 21 on page 6-20]

1. Remove the internal unit.

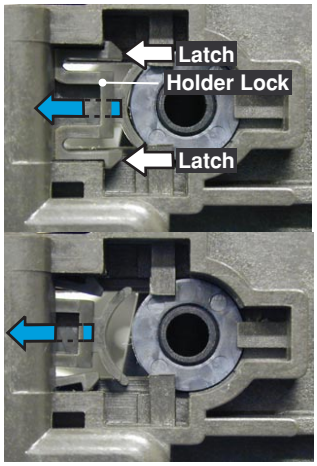
2. Remove the Ribbon Feed Motor cable from the Dot Driver PCB (CN5).
3. Remove the three pins and four screws that secure the Plate, then remove the Plate.



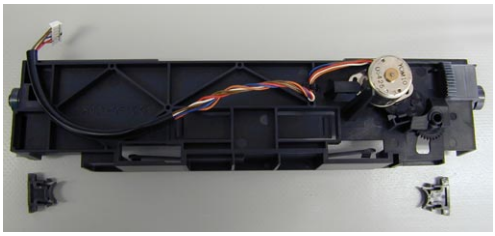
4. Remove the latch from the Holder Lock on the left panel, then slide it to the right side and remove the Holder Lock.



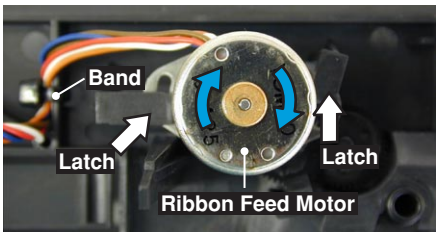
5. Remove the latch from the Holder Lock on the right panel, then slide it to the left side and remove the Holder Lock.



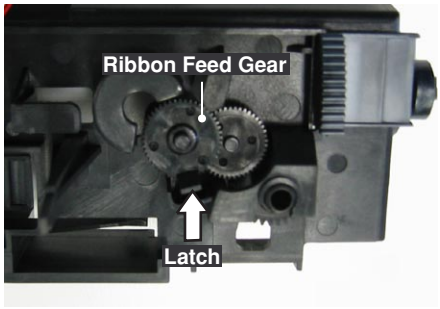
6. Pull the Ribbon Holder Assembly toward you and remove.



7. Disconnect the Band that holds the cables in place. Remove the two latches securing the Ribbon Feed Motor, then turn clockwise and remove the Ribbon Feed Motor.



8. Release the latch securing the Ribbon Feed Gear, then remove the Ribbon Feed Gear.

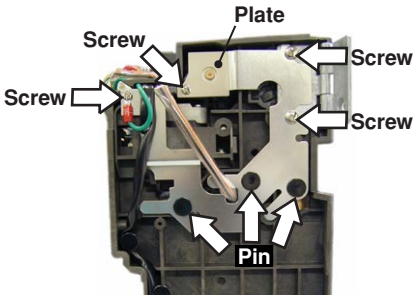


Carriage Assembly (B8803BB) [Item 24 on page 6-20]
Pully (B9901EY) [Item 30 on page 6-20]

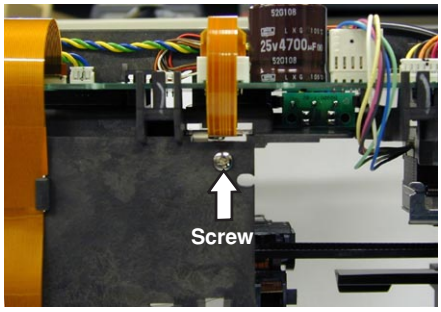
CAUTION

Do not apply lubricant to the Shaft.

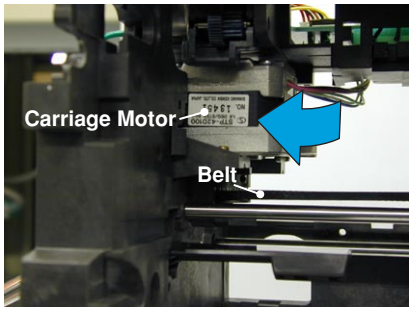
1. Remove the internal unit.
2. Remove the FPC extruding from the Carriage Assembly from the Dot Driver PCB (CN6).
3. Remove the three pins and four screws that secure the Plate, then remove the Plate.



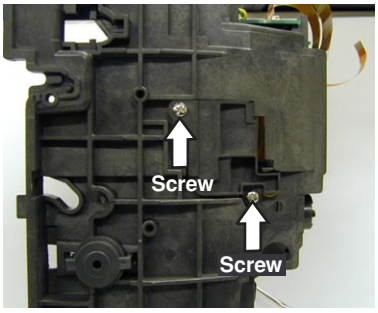
4. Remove the screw securing the FPC.
(Screw tightening torque: 0.59 to 0.69 N·m).

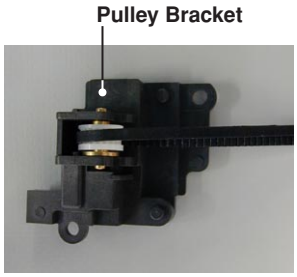


5. Move the Carriage Motor to the right to loosen the Belt tension, then remove the Belt from the Carriage Motor Pulley.



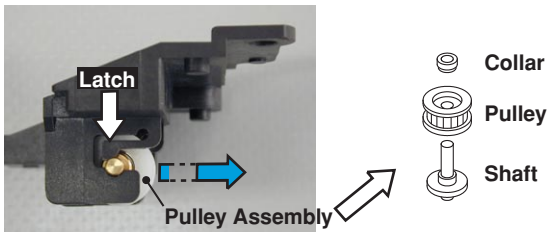
6. Remove the two screws securing the Pulley Bracket.
(Screw tightening torque: 0.59 to 0.69 N·m).





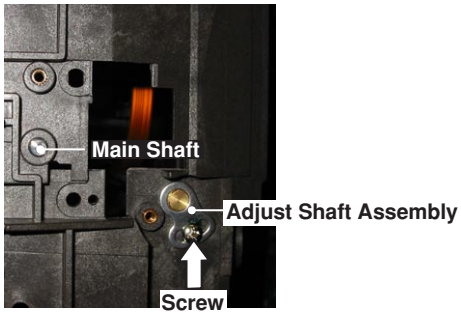
Removing the Pulley

7. Release the Pulley Bracket latch. Remove the Belt from the Pulley Assembly.

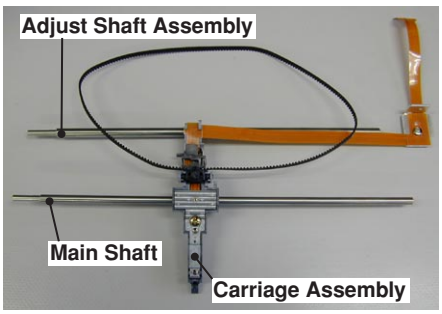


Removing the Carriage Assembly

7. Remove the screw securing the Adjust Shaft Assembly, then pull out the Main Shaft and Adjust Shaft Assembly from the internal unit and Carriage Assembly.
(Screw tightening torque: 0.59 to 0.69 N·m).

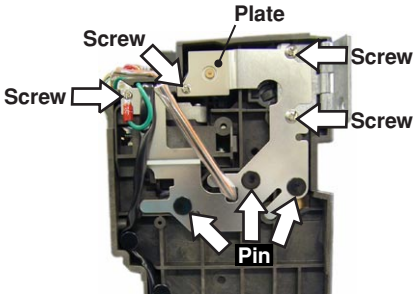


When removing the Adjust Shaft Assembly, see section 4.3, “Adjusting the Height of the Carriage.”

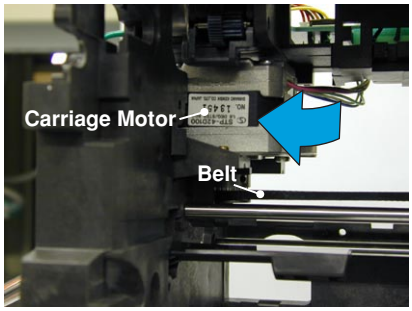


Carriage Motor (B9906FX) [Item 13 on page 6-20]

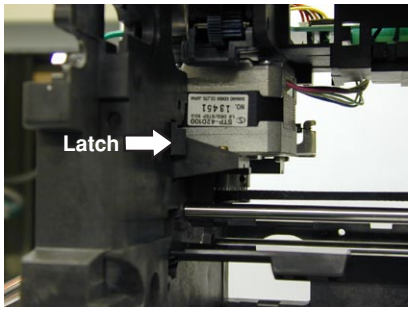
1. Remove the internal unit.
2. Remove the cable extruding from the Carriage Assembly from the Dot Driver PCB (CN8).
3. Remove the three pins and four screws that secure the Plate, then remove the Plate.

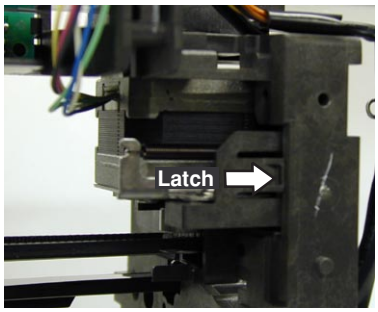


4. Move the Carriage Motor to the right to loosen the Belt tension, then remove the Belt from the Carriage Motor Pulley.

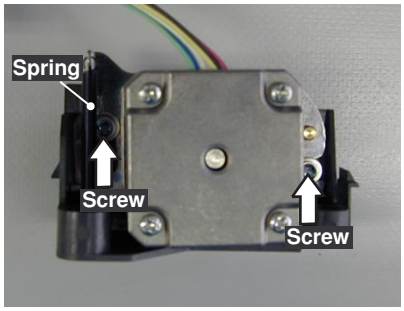


5. Release the two latches securing the Motor Bracket Assembly, then pull out the Motor Bracket Assembly.

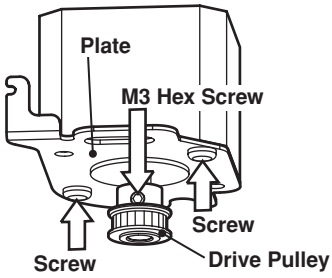




6. Remove the Spring and two screws, remove the Motor Plate Assembly. (Screw tightening torque: 0.59 to 0.69 N·m).

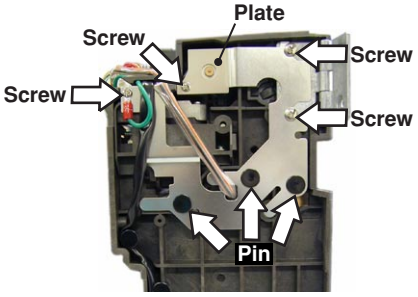


7. Remove the two screws and M3 hex screw, remove the Plate and Drive Pulley. (Screw tightening torque: 0.59 to 0.69 N·m, M3 hex screw tightening torque: 0.20 to 0.26 N·m).

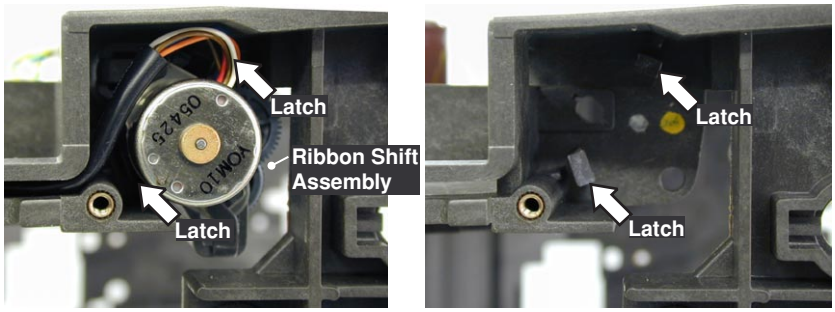


Ribbon Shift Motor - Ribbon Swing Motor (B9906FS) [Item 8 on page 6-19]
Ribbon Shift Gear Box - Ribbon Swing Gear Assembly (B8803BS) [Item 7 on page 6-19]

1. Remove the internal unit.
2. Remove the cable extruding from the Ribbon Shift Motor from the Dot Driver PCB (CN4).
3. Remove the three pins and four screws that secure the Plate, then remove the Plate.



4. Release the two latches securing the Ribbon Shift Assembly, then pull out the Ribbon Shift Assembly.



5. Release the two latches securing the Ribbon Shift Motor, then turn the Ribbon Shift Motor counterclockwise and remove it.